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New Mode of Mounting Cannon.

The accompanying engraving illustrates a mode of mounting cannon, by which the guns may be loaded while the men are perfectly protected, even in operating heavy barbette guns.

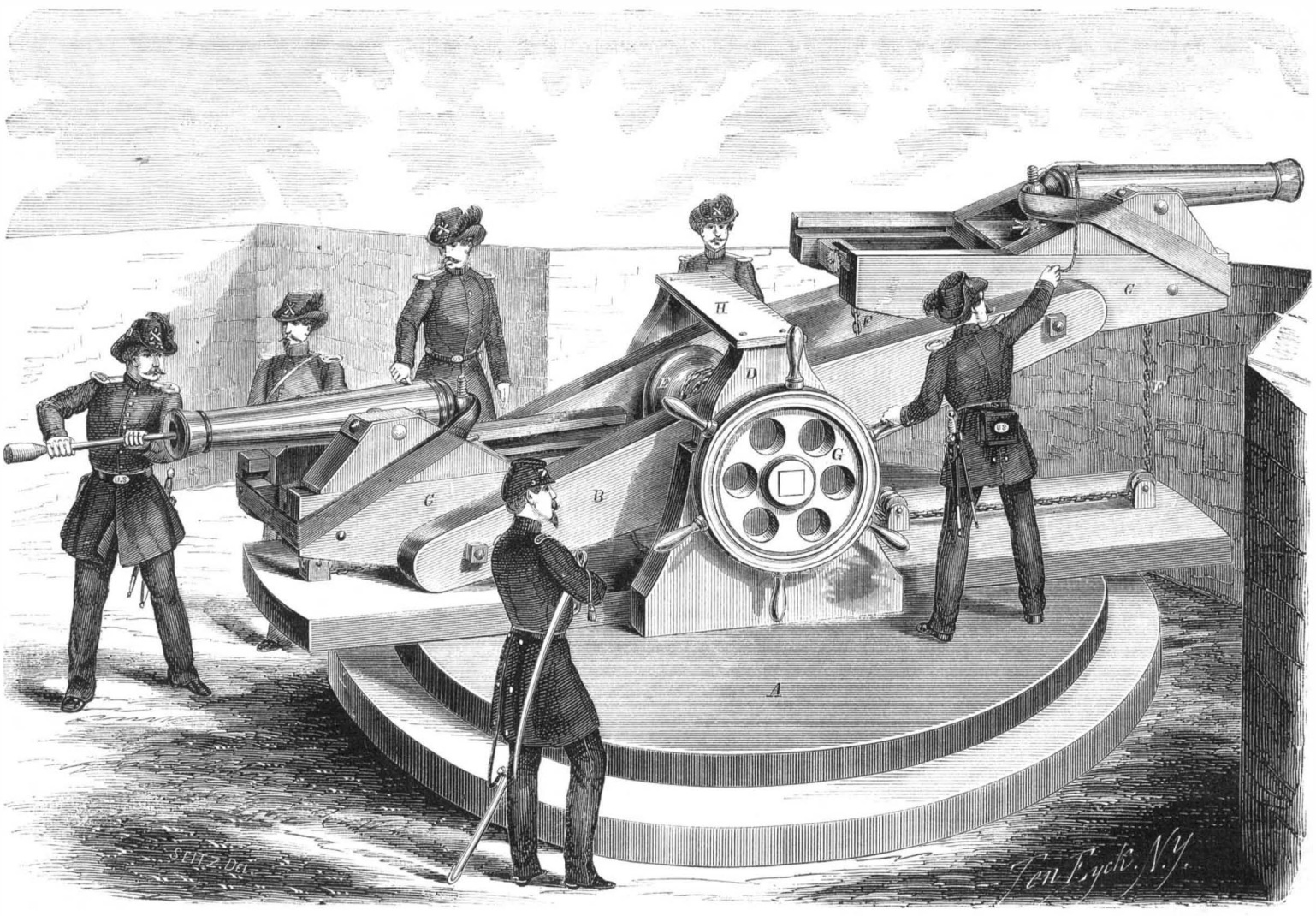
A circular platform, A, is pivoted at the center to a solid base below, and fitted to revolve on friction rollers. Upon this platform is secured the vibrating frame, B, which sustains the gun carriages, C C. The frame, B, is made of great strength, and is supported by the uprights, D D, by means of a massive shaft, E, in such manner that it may oscillate on this shaft.

The gun carriages, C C, are supported at the ends of the frame, B, on shafts, so that they also may oscillate in relation to the frame, though they are maintained in a horizontal position by means of chains. These chains, F F, are attached to both ends of the gun carriages, and carried around the shaft, E, to which they are secured, so that they may wind up and unwind equally and together, thus keeping the gun carriages always in a horizontal position.

The shaft, E, is turned to wind the chains upon it, and thus oscillate the frame, B, by means of the hand wheel, G.

As soon as the elevated gun has been discharged the platform, A, is turned upon its central pivot, in order to bring the other gun into position; the wheel, G, at the same time being turned to oscillate the frame, B, and bring down the discharged gun and carry the loaded one up over the level of the parapet. As the gun comes into position, a man steps upon the platform, H, for an instant, to direct the aim; and it is only for this instant that the gunner or any one of the garrison is exposed to the enemy's fire.

The recoil of the guns is taken up by heavy india-rubber straps, carried around the breech of the gun, as shown.



HOPKINS'S IMPROVED MODE OF MOUNTING CANNON.

By this mode of mounting, the gun is exposed to the enemy's fire only for a brief space, while in position, and the men are not exposed at all, with the exception of the brief and partial exposure of the man who directs the aim.

In casemates there is the advantage of having two guns to fire alternately from one embrasure; one being in a safe position to be loaded, while the other is brought to bear upon the enemy's ships or troops and discharged.

In mounting cannon in this manner for naval purposes, there may be the advantage of not having openings in the bulwarks, as the gun can be turned to any point, elevated and fired over the bulwark.

The patent for this invention was granted Dec. 17, 1861, and further information in relation to it may be obtained by addressing the inventor, Obadiah Hopkins, at No. 420 Sixth avenue, New York city.

To Render Ivory Flexible.

In reply to a correspondent, the editor of the *Amer. Drug. Circ.* says that to "to render ivory flexible, it should be immersed in a solution of pure phosphoric acid of sp. gr. 1.130, and left there until it ceases to be opaque. It should be then taken out, washed with water, and dried with a soft cloth. It is now so flexible that it may be bent like leather. On exposure to dry air it returns to its original hardness, but it becomes flexible again by treating it with hot water. There is no difficulty in giving to ivory various colors —black, blue, green, red violet, &c. The process is simply one of dyeing. You are mistaken in supposing that ivory is composed chiefly of carbonate of lime. Like the substance of all teeth, it is mainly phosphate of lime, with a little carbonate, and a large quantity, equal to about one-fourth of the whole, of gelatinous matter or cartilage."

A six horse power steam engine drives one set of cards with all its attendent machinery in a woolen mill.

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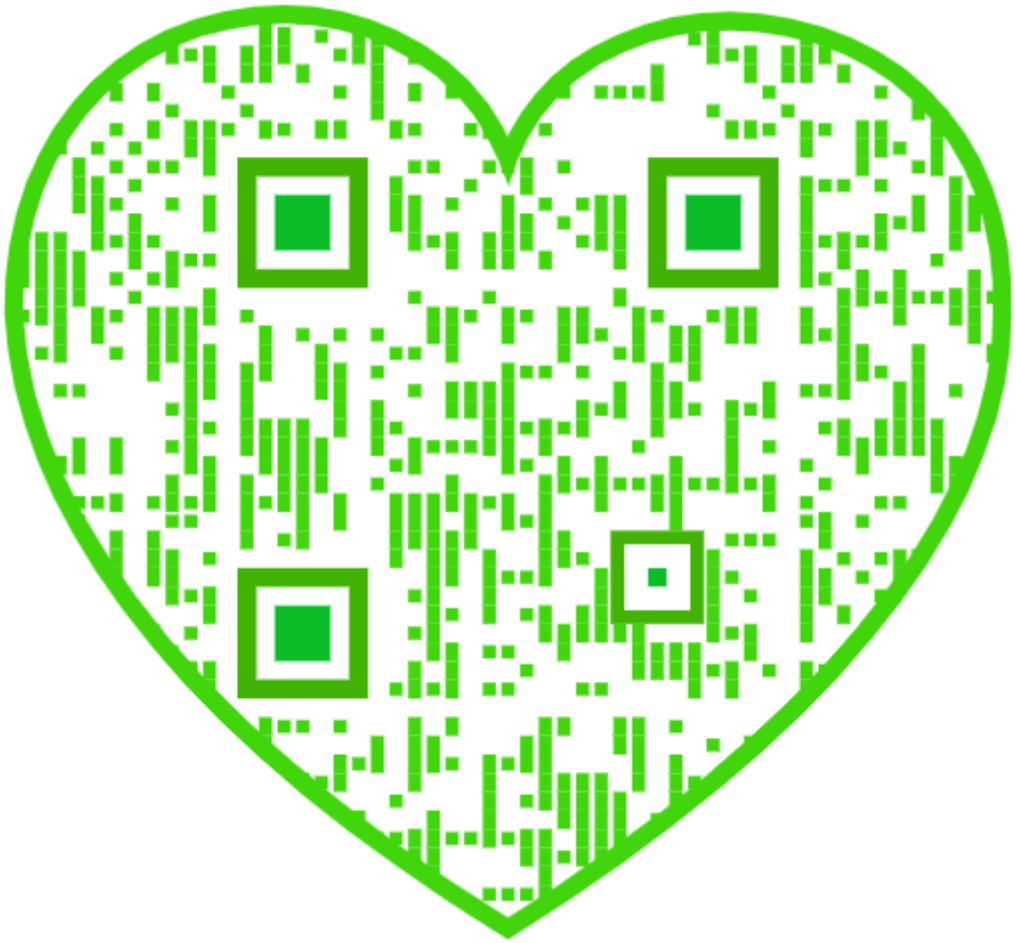

NOTES ON MILITARY AND NAVAL AFFAIRS.

THE SITUATION.

The latest intelligence from General Burnside shows that he is gradually advancing with his gunboats up the Chowan river towards the Seaboard and Roanoke railroad, and which has a direct communication with Norfolk, distant about sixty miles. Burnside's operations may be directed either towards Weldon, N. C. or Norfolk, Va. A few days more will determine his movements. He is an energetic commander, and will not remain idle. His advance toward the town of Winton was fired upon from the shore, and it is stated that the gunboats shelled the town.

Cumberland Gap, it is reported, is now in possession of the Union forces. This is a position of great importance, being the door to East Tennessee, and within 30 miles of the Tennesse & Virginia railroad, the great arterial line of communication between Richmond and the Southwest. The loyal men of East Tennessee who have struggled so long for deliverance, now see the door open to them, and they will soon rally in strong force under the ample folds of the old flag.

OCCUPATION OF CLARKSVILLE AND NASHVILLE.

Immediately after the surrender of Fort Donelson Commodore Foote pushed up the Cumberland river with gun and mortar boats, with a view to bombard the fortifications at Clarksville, which is some thirty miles above Dover and some fifty miles below Nashville. As he approached the town two-thirds of the inhabitants fled. The Mayor of the city, with Hon. Cave Johnson and Judge Wisdom, sought an interview with Commodore Foote, for the purpose of ascertaining what his intentions were, and, at their request, he issued a proclamation, assuring all peaceably-disposed persons that they might with safety resume their business avocations, requiring only the military stores and equipments to be given up, and holding the authorities responsible that this shall be done without reservation. The rebels retreated to Nashville, having set fire, against the remonstrance of the citizens, to the splendid railroad bridge across the Cumberland river. A large amount of stores were left at Clarksville—enough, it is reported, to feed our army twenty days. This place was very strongly fortified, and, it was supposed, would be held, if possible.

The sudden evacuation of Bowling Green, the fall and surrender of Fort Donelson, and the hasty retreat from Clarksville left Nashville, the capital of Tennessee, in a very defenceless condition, and it is reported that the utmost consternation prevailed among its inhabitants, and many of them, in their guilt of treason and disloyalty, precipitately fled the city, fearing the approach of the Union forces under the gallant Gen. Mitchell, and the gun and mortar fleets under the brave Commodore Foote. It is said that orators appeared on every corner, who mounted boxes, empty wagons, or any other convenient rostrum, and urged the people to pick up whatever they could lay their hands on in the shape of weapons, and prepare for battle, but the people seemed not to like this sort of thing. The smothered sentiment of loyalty indisposed them to fight against their approaching deliverance from Jeff Davis's tyranny. From the tomb of the Hermitage, hard by, they heard a dead patriot's voice ringing in their ears, "The Union, it must and shall be preserved."

It was reported and very generally believed at the time of our going to press, that the city of Nashville was in possession of the Federal forces. That city has been the point of great importance to Jeff. Davis, and has supplied a vast amount of war material to his army. It is the capital of Tennessee, and contains 26,000 inhabitants. If this report should be fully confirmed it will be another heavy blow to the hopes of the Confederate instigators of rebellion. Columbus must fall, and with it the whole valley of the Mississippi will be laid open to the advance of our forces. The thirty-eight mortar boats which have been in progress of construction for the Mississippi are now complete, and Capt. Constable declares that he can reduce every one of the enemy's works with this fleet alone.

CONFEDERATE SPIES.

S. R. Mallory, Secretary of the Confederate Navy, in July last, wrote a letter to Lieutenant Brown, of Memphis, to have him employ some expert to visit Cincinnati and obtain all the information he possibly could in reference to the iron-clad gunboats which were said to be building in that city. He wanted a mechanic who could and would obtain means of accurately reporting the character of the vessels, whether steamers or not; and if steamers, whether propellers, and their size and armament, and whether and to what extent, they are protected by iron; in what manner it is secured, and its thickness. Respecting such details as these, together with the number of vessels being prepared at Cincinnati, or elsewhere on the Ohio, Arkansas, or Mississippi rivers, Mr. Mallory suggests that "perhaps a mechanic now at work on the boats could afford the information," and expresses a willingness to pay for it. He did not get it.

A NOVEL TELEGRAPHIC DEVICE.

It appears that Gen. Buckner, who commanded the Confederate forces at Fort Donelson, and was taken prisoner, had an ingenious telegraphic communication between his headquarters at Dover and the different fortifications at the fort. A wire extended from the headquarters all through the fort, with batteries at each redoubt and important points. By this means it was calculated that troops could be ordered from place to place with much greater speed than by the usual medium of a courier on horseback; and it is said by rebel officers it worked admirably during every attack. While the engagement on Saturday was going on Gen. Buckner stood upon a hill in the rear of the fort, viewing everything through a spyglass. A telegraphic operator was by his side, with a pocket instrument in his hand, and by this means all orders were transmitted from the commanding officer to the troops within the fort.

The Louisville *Journal* says that the best officers in our service consider Buckner a much more able and talented officer than A. S. Johnson.

It is understood that Gen. Buckner has been handed over to the civil authorities, to answer for the crime of being a spy and a traitor.

THE SECTETARY OF WAR DECLINES THE HONOR.

Upon the announcement of the great victory at Fort Donelson the *N. Y. Tribune*, in a double-leaded editorial, claimed all the honor for Mr. Stanton, who had been but a few days in office. Mr. Stanton, feeling that great injustice had been done to the officers and soldiers, addressed the following letter to that journal, which deserves to be read by all men :—

SIR :—I cannot suffer undue merit to be ascribed to my official action. The glory of our recent victories belongs to the gallant officers and soldiers that fought the battles. No share of it belongs to me.

Much has recently been said of military combinations and organizing victory. I hear such phrases with apprehensions. They commenced in infidel France, with the Italian campaign, and resulted in Waterloo. Who can organize victory? Who can combine the elements of success on the battle field? We owe our recent victories to the spirit of the Lord, that moved our soldiers to rush into battle, and filled the hearts of our enemies with terror and dismay. The inspiration that conquered in battle was in the hearts of the soldiers and from on high; and whenever there is the same inspiration there will be the same results. Patriotic spirit, with resolute courage in officers and men, is a military combination that never failed.

We may well rejoice at the recent victories, for they teach us that battles are to be won now and by us in the same and only manner that they were ever won by any people, or in any age, since the days of Joshua, by boldly pursuing and striking the foe. What, under the blessing of Providence, I conceive to be the true organization of victory and military combination to end this war was declared in a few words by Gen. Grant's message to Gen. Buckner—"*I propose to move immediately on your works.*" Yours, truly, EDWIN M. STANTON.

IRON-CLAD VESSELS.

Ten millions of dollars is the sum appropriated by Congress for the complete construction and equipment of iron-clad vessels for river, harbor and coast defence, and for which the Navy Department invites propositions. It has determined to furnish no plans, but to leave the submission of them to the constructors in order to develop the latest genius in designs best calculated for effective purposes, and the Department will make its selections accordingly.

MISCELLANEOUS.

Among the interesting official correspondence laid before the British Parliament, Earl Russell reports the substance of a conversation he had with Messrs. Yancey, Rost and Mann, the delegates who waited upon him to urge the recognition of the Confederate States. His answer to these gentlemen was that England would observe strict neutrality. Earl Russel said :—"Her Majesty cannot acknowledge the independence of nine States until the fortune of arms or a more peaceful mode of negotiation shall have more clearly determined the respective positions of the two belligerents." Our relations with foreign powers have vastly improved since the Trent affair. It seem clearly to have been one of the links in the chain of Divine Providence to aid the Federal Government in its efforts to crush the rebellion. The admirable position of our Government in this affair has completely disarmed active foreign hostility.

Previous to Gen. Johnson's evacuation of Bowling Green, his troops were engaged in burning public and private buildings, hotels, stores, pork houses, tobacco factories, saw-mills, depots, railroad and turnpike bridges, and rolling stock. In that time they destroyed property of Unionists and rebels to the amount of $1,000,000. It is stated that they never had over 30,000 men in and around Bowling Green; that 5,000 died there, and 3,000 sick were hurried off; that their regiments were skeletons, not averaging 500; that the Provisional Treasurer and one or two Provisional Sheriffs ran off with $50,000, extorted and stolen from Kentuckians; and that his Provisional Excellency emphatically declares the Provisional government is played out.

The nomination and prompt confirmation of Ethan Allen Hitchcock as Major General of Volunteers will give great pleasure to many who know that officer well. General Hitchcock is a native of Vermont, and comes of good fighting stock, being the grandson of the intrepid old patriot whose name he bears. He is a West Point graduate, was Assistant-Adjutant General to General Scott in Mexico, and was made a Brigadier by brevet for his conduct there. He is one of the men with whom Jefferson Davis managed to quarrel, and leaving the army in consequence, has since resided at St. Louis. He offered his services soon after the fall of Sumter. General Halleck has since urged his appointment, and has now happily succeeded.

The Whitworth gun, a long rifled cannon presented to the Government by some of our countrymen in Europe, was sent off from the Arsenal on the 19th ult. for Budd's Point.

A letter from Newport News ascribes the bursting of the Sawyer gun, recently, at at that place, to the fact that the ball was not rammed home.

Gen. Grant has energetically issued orders for a speedy forward movement to still greater victories.

The Richmond *Whig* does not like Jeff. Davis very much. On Friday Feb. 21st, the day before his inauguration, it indulges in the following conclusion :—

Judging by results so far, it is the most lamentable failure in history, and suggests to the reflecting mind, that the most signal service which that government can now render to the country is the surrender of the helm to abler and better hands. In view of the past, the present and probable future, the pageant of to-morrow is a bitter mockery, and a miserable compensation for the ruin of a free people. A child with a bauble—an old man with a young wife, are partial illustrations of the deplorable folly.

Acting under authority of Congress the government took possession of all the telegraph lines in the United States, on the 26th Feb., and they will henceforth be under its control. The daily press will undoubtedly find great fault with this seemingly arbitrary action of the government, but circumstances have demanded this act as one of necessity, and every good citizen will acquiesce in the measure. The telegraph and the press have done great evil to the cause of the country by publishing intelligence which has greatly benefitted the enemies of the Union.

ANECDOTE OF A GATE.—A correspondent of the *Home Journal*, writing of gates, tells this anecdote :—I once passed through a dooryard gate which did, unintentionally, give an indication of the designer's character. The gate was a common one, shut by a chain and ball; but the post to which the inner end of the chain was attached was carved and painted in the likeness of a negro, with one hand raised to his cocked hat, and the other extended to welcome you in. As you opened the gate toward you in going in, the negro post-pointer bent toward you, by a joint in his back, fairly bowing you in. Upon letting the gate go, a spring in his legs "brought him up standing" again, ready for the next comer. This faithful fellow performed the amiable for his master for many years, without reward, except now and then a coat—of paint; but finally died of a rheumatic back, contracted in his master's service.

BRITANNIA metal is composed of tin and about 12 per cent of antimony.

IN woolen factories there are 240 spindles to one set of cards and three carding machines in a set.

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Appropriations for Fortifications.

The Committee on Military Affairs report the following amount of appropriations for the fortifications :—

For Fort Montgomery, Lake Champlain, New York	$100,000
For Fort Knox, Penobscot River, Maine	100,000
For Fort on Hog Island Ledge, Portland harbor, Maine	100,000
For Fort Warren, Boston harbor, Mass	75,000
For Fort Winthrop, Boston harbor, Mass	50,000
For Fort at New Bedford harbor, Mas,	100,000
For Fort at Willet's Point, New York	200,000
For Fort on site of Fort Tompkins, Staten island, New York	200,000
For Fort at Sandy Hook, New Jersey	300,000
For Fort Delaware, Delaware river	60,000
For Fort Carroll, Baltimore harbor, Maryland	200,000
For Fort Calhoun, Hampton Roads, Virginia	200,000
For Fort Taylor, Key West, Florida	200,000
For Fort Jefferson, Garden Key, Florida	200,000
For Fort at Fort Point, San Francisco, California,	200,000
For Fort at Alcatraz Island, San Francisco, Bay California	150,000
For contingencies of fortifications, including field works	500,000
For bridge trains, and equipage for armies in the field	250,000
For tool and siege trains for armies in the field	250,000

The following items are for the present fiscal year, ending June 30th, 1862 :—

For fortifications on the northern frontier, including fortifications at Oswego, Niagara, Buffalo, Detroit, and Mackinaw	750,000
For Fort Montgomery, at the outlet of Lake Champlain, New York	50,000
For Fort Knox, Penobscot river, Maine	50,000
For Fort on Hog Island Ledge, Portland harbor, Maine	50,000
For Fort Winthrop and exterior batteries, Boston harbor, Massachusetts	50,000
For Fort at New Bedford harbor, Massachusetts	50,000
For Fort Adams, Newport harbor, Rhode Island	50,000
For Fort Schuyler, East River, New York	25,000
For Fort at Willet's Point, opposite Fort Schuyler, New York	50,000
For Fort Richmond, Staten Island, New York	25,000
For Fort on site of Fort Tompkins, Staten Island, New York	50,000
For commencement of casemate at battery on Staten Island, New York	100,000
For new battery at Fort Hamilton, at the Narrows, New York	100,000
For Fort Mifflin, near Philadelphia, Pa.	25,000
For new fort opposite Fort Delaware, on Delaware shore	200,000
For Fort Monroe, Hampton Roads, Virginia	50,000
For Fort Taylor, Key West, Florida	100,000
For Fort Jefferson, Garden Key, Florida	100,000
For additional fort at the Tortugas, Florida	200,000
For Fort at Ship Island, coast of Mississippi	100,000
For contingencies of fortifications	100,000
For bridge trains and equipage	250,000

Horses.

Col. Needham, the Secretary of the Vermont State Agricultural Society, in his annual report says :—The number of horses in Vermont before the breaking out of the rebellion was about fifty-five thousand, since which time it is calculated that nearly ten thousand have been carried from the state for army purposes. This immense levy for horses has been made throughout the entire country. When it is considered that comparatively few of these horses will find their way back; that the number that will die of disease or become unfit for service is twenty times as great as it would be were they used in other kinds of business; that to meet this great want of the Government, a large proportion of the business horses in our large cities, which have been thrown out of service by general prostration, has been bought up, it readily appears that even during the war, horses must advanc e in price; and at its close, when business shall revive, and trade resume its former channels, the demandfor good horses must exceed the supply. Reasoning from these premises, no more profitable labor can be engaged in than the production of good business horses.

The Ear and Cannon Firing.

A short time ago a correspondent of the Philadelphia *Ledger* suggested to artillerists to keep their mouths open when a cannon is discharged, in order to protect their ears from injury. Dr. Von Mosckzisber, the aurist, says that this is a remedy so far as we have a voluntary power of rendering the tympanum tense through the means of the ossicula and their muscles. He adds the following simple, yet useful remedy to obviate many of the injuries to which gunners are exposed. It consists of a solution of glycerine oil and belladonna—say about one ounce of glycerine to fifteen grains belladonna. Saturate a piece of cotton well in this solution, and place it in the ears as far as possible. This solution forms a coating in itself on the membrane, and, with the addition of the cotton, protects the drum of the ear to the utmost extent. When the cotton is removed the coating can be readily washed out by syringing the ear with a little warm water. The preparation will also obviate disease to which the ear is subject from night air and exposure from damp ness, and incurred from sleeping in tents and the open fields.

Census Returns---Manufacturing Industry.

The statistics of the last census are not yet published, but some interesting facts have come from the census bureau regarding several important manufacturing interests. The following are some of these :—Value in 1850—Pig Iron, $19,662,523; Bar Iron, $11,160,851. Value in 1860—Pig Iron, $29,055,000; Bar, rolled, $33,000,000. The iron product has doubled in the last ten years, it being but $30,823,374 in 1850, and no less than $62,055,000 in 1860.

The returns of the cotton manufacturers of the country will be more accurate than in any former report. They were set down in the census of 1850 at $65,500,687. The returns from New England alone in 1860, amount to $79,000,000; the woolen goods of the United States were estimated at $39,848,557, but New England alone in 1860, returns the value of woolen goods at $32,000,000. In boots and shoes, the census of 1850 for the whole United States returned only $53,967,408; Massachusetts alone in 1860 estimates her production in this branch of industry at $46,000,000. Philadelphia returns nearly $6,000,000.

The value of the products of industry of all branches in 1850, was computed at $1,019,106,616. In 1860 it will reach $1,900,000,000, or an increase of about eighty-seven per cent. The production of Pennsylvania is set down at about $285,000,000. New York, $398,000,000. The greatest increase since 1850 is in agricultural implements, iron, malt liquors machinery, clothing, cotton goods, refined sugar, gold mining, &c.—*Phila. Ledger.*

Modification in the Process of Making Steel.

L'Invention publishes the following extract from Letters Patent recently obtained in Belgium by the well-known French chemists, MM. Margueritte, and Lalouel de Sourdeval, for an improved process of making steel :—

A mixture is made of carbonate of baryta and bituminous coal finely pulverized, in proportions varying with the quality of the coal, and this mixture is placed in cementing troughs, or other suitable apparatus, such as gas retorts, ovens, &c. The bars or sheets of iron are disposed in the ordinary manner in the mixture, and kept at a bright red heat for a sufficient time to effect the cementation, which varies with the size of the pieces. The iron is then separated from the coal, when it presents the fracture, the grain, the hardness according to the temper, in short all the qualities of the most beautiful steel. In this process the coal presents at first to the iron a purifying agent, hydrogen, which aids the cementation by making a way for the nitrogen and the carbon. It follows from this that all hydrogen compounds, and especially ammonia, ought to exercise an excellent influence on cementation. A current of ammonia gas passing over red-hot iron disengages notable quantities of the sulphide of hydrogen. In this operation the refining of the iron precedes, or is at least simultaneous with, the cementation.

In regard to the fixing of the nitrogen, it may take place either in consequence of the formation of the cyanide of barium, or at the expense of the atmospheric air which circulates freely in the mixture, or finally by the decomposition of the ammonia disengaged from the coal. Other combustibles, mineral or vegetable, anthracite, lignite, wood, charcoal, &c., may be substituted for the bituminous coal, but with less advantage as they contain smaller quantities of nitrogen.

Spectrum Analysis.

The London *Photographic News* has the following summary of the present state of knowledge on this interesting subject :—

The subject of spectrum analysis is still affording grounds for much scientific debate. It may be remembered that we have on more than one occasion pointed out that there were many reasons, experimental as well as theoretical, for concluding that the sweeping explanation of the cause of Frauenhofer's lines given by the German *savans* was, to say the least, open to great doubts. This opinion is now gradually gaining ground among scientific men. The Editor of the *Chemical News* has taken the same view as ourselves, and the late meeting of the Pharmaceutical Society, Dr. W. A. Miller, in his lecture on this subject, urged the necessity of still considering the views of Kirchhoff and Bunsen as theoretical, there being many points which presented anomalous features. Some spectral lines, he said, were due to the incandescent metals, but others, undoubtedly, belonged to the atmosphere or to the different gases in which the ignition of the metal took place. The rise of temperature, too, evoked different lines from the same substance. Chloride of lithium, in a Bunsen burner, gives a single crimson ray; in the hotter flame of hydrogen an additional orange ray appears; whilst the oxyhydrogen jet, or the voltaic arc, brings out a broad, brilliant blue band in addition; the same takes place with sodium and other metals. Fascinating as the German theory is, it must be remembered that it is still upon trial, and that it does not yet explain the facts known respecting the vapors of hydrogen, mercury, chlorine, bromine, sodium, or nitrogen. It was expected that spectral observations on the corona seen during the late solar eclipse on the 31st of December last would throw considerable light upon this obscure point. Up to the present moment, however, we have not heard what results were obtained. It will be remembered by our readers that, according to Kirchhoff's theory, that the sun consists of a central solid or liquid incandescent mass surrounded by luminous metallic vapors, the partial opacity of which occasioned the black lines of the spectrum—according to this theory, the light from the corona should proceed entirely from this incandescent metallic vapor and that in consequence of there being no more highly illuminated body behind it, the ordinary black lines ought to come out bright and luminous. This, if observed, would be one of the most startling results of the day, and would conclusively prove the truth of this beautiful theory, whilst the non-observance of such a reversal of the Frauenhofer line would seriously militate against the hypothesis.

The Barbarism of Steel Pens.

I am aware, says a recent writer, that it may be very fairly said that if a man is green enough to be induced by any representations of seller or advertiser, to make his coffee with a windlass, and shave himself with a stone, the only verdict he can expect from an intelligent jury is "served him right;" but look at another invention, under the tyranny of which we all groan more or less, but which very few have the strength of mind to resist. Has not the curse of steel pens swept over the land until decent handriting is almost unknown? Do not ninety-nine persons in a hundred use steel pens, and has more than one out of the ninety-nine the effrontery to say he can write with them? Lord Palmerston was quite right—the handwriting of this generation is abominable; and as new improvements in steel pens go on, that of the next will be worse. The fine Roman hand of the last century has died out; the steel can't do it. There is neither grace nor legibility in the angular scrawl that prevails now. Open any parish register of fifty years back, and see in what a fine legible hand, and scholar-like too in most cases, the parson of that day made his entries. Our present young parson, though he took a first-class at Oxford, and wears a most correct waistcoat, doesn't do it, and couldn't do it if his benefit of clergy depended on it.

THE armor plates for the new British frigate *Royal Oak* are to be put on vertically. Each plate will be 4½ inches thick, 15 feet in length and 3 feet 2 inches in width and will weigh four tuns. The cost of each will be $600. This vessel is to be covered from stem to stern with such plates.

ABOUT 40 spindles are allowed for each loom in a cotton factory; 144 spindles in one spining frame. Each frame supplies about three and a half looms.

THE Ericsson iron-clad steam battery is called the *Monitor*, and was put into commission at the Brooklyn Navy Yard last week.

A VERY soft solder used for soldering pewter is composed of 2 parts tin, 1 of bismuth and 1 of lead.

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Relief for Fractured Limbs.

Among the many sad calamities which war brings in its train fractured limbs have formed a large list of the casualities connected with the soldier's eventful life. Every device which tends in the least to relieve pain, and thus afford some comfort to the wounded soldier, deserves respectful consideration.

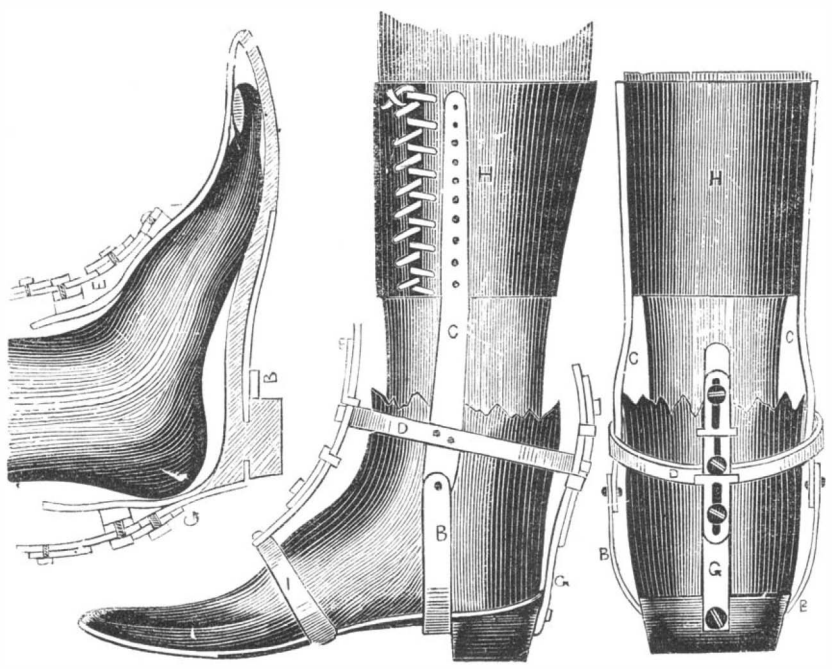
The accompanying illustration represents an improved surgical apparatus, designed and patented several years ago, (but not to be overlooked on this account,) by George Yerger, of Philadelphia, the object of which is to support the ankle that has been fractured, and relieve it from pressure, after the person who has been wounded has commenced to walk.

Fig. 1 is a side elevation of a boot with the improvement attached. Fig. 2 is a section of the same, and Fig. 3 a back view of the same. Similar letters refer to like parts.

This improvement consists in securing to the shank and heel of the boot designed for the fractured or otherwise injured limb a series of curved spring and jointed bars, I G B C, corresponding as nearly as possible with the boot to which they are contiguous, extending over the front part and instep, and upward behind and on the sides of the ankle, and on the sides of the calf of the wearer, and attached at this last-mentioned part to a pad, H, corresponding with the form of the calf of the leg, in such a manner as to cause the weight of the body of the wearer to rest entirely on the lower part of the calf of the leg, except a slight pressure on the front part of the foot. The oval bar, D, being attached permanently to the bar, C, and loosely to the slotted spring bars, E G, allows a slight movement to the leg of the afflicted person.

As represented by Fig. 2, the ankle is sustained in a position which suspends the heel of the wearer above that of the inside of the boot, and thus relieves it from the pressure of the body, thus forming a graduated spring support for the injured ankle.

Fig. 2. *Fig. 1.* *Fig. 3.*



YERGER'S IMPROVEMENT IN SURGICAL APPARATUS.

Lake Superior Copper.

Respecting the product of several mines for 1861 the *Mining Gazette* says :—The product of the Pewabic mine for the twelve months ending December 31, 1861, is 2,194,286 lbs. of net mineral, which yielded of ingot copper 1,800,115 lbs., or 900 tuns 115 lbs. This shows a very high purity of their mineral, which rates at about 82.14 per cent of pure metal. The product of the Franklin mine, for the same period, was 1,719,491 lbs. of net mineral which produced 1,399,-609 lbs. of ingot, or 609 tuns 1,609 lbs. This shows an average purity of more than 81¾ per cent of pure metal. The product of the Isle Royale mine in net mineral, for the year ending Dec. 31, 1861, was 686 tuns and 1,423 lbs. The product of the previous year was 445 tuns and 311 lbs., making an increase of 241½ tuns in favor of the year 1861. The expenses of the mine during the same period were, we believe, not increased at all.

The Rev. Dr. Clement M. Butler, of Washington City, recently delivered a lecture at the Historical Rooms, in this city, upon Washington City during the rebellion. In the course of his address he paid a high tribute to the Hon. Joseph Holt, whom he characterized as the most patriotic man in the country—a man, moral, religious, and full of sensibilities, the manliest of men. He could not be driven out by taunts, and the Capital owed more to him than to any other man. He never sought office, but was sought for it, and he alone stood loyal at the helm of the Ship of State, while the pirate crew were getting out the plunder and the longboats.

Carbolic Acid for Wounds &c.

The following useful information is given by Dr. F. Crace Calvert, F. R. S., in a communication to the *Pharmaceutical Journal* :—Although carbolic acid has long been known to possess powerful antiseptic properties, its use has been delayed in medicine owing to the difficulty experienced in obtaining it in considerable quantities and in a state of purity, as well as to the caution required in introducing new substances in that branch of science. The success, however, which has lately attended its application, will tend greatly to increase its importance as a therapeutic agent. It has been used with marked advantage in the Manchester Royal Infirmary by several of its distinguished physicians and surgeons. Thus, Dr. Henry Browne has given it in solution of chronic diarrhea, with very satisfactory results. Dr. Roberts has applied it with very great success in the dose of one drop, in cases of vomiting, even after creosote had failed; he has also found it beneficial in cases of vomiting from dyspepsia, which disease is especially marked by pain after food. Mr. J. A. Ransome has used it for ulcers and other offensive discharges. Mr. Thomas Turner, in a note which he has communicated to me, speaks of carbolic acid in the following terms :—

It may be advantageously used as a solution of one part of acid in seven parts of water, in fetid ill-conditioned ulcers. It alters the action of the blood-vessels, causing a purulent instead of a sanious discharge, and destroys almost immediately the offensive smell of the secretion. The ulcers having a communication with carious bone, or even necrosis (where the bone is dead), it has in its diluted state a good effect when ejected into the sinuses leading to the diseased bones. When there is mere caries or ulceration of the bone, it effects the healing process; and in necrosis it promotes the exfoliation of the dead portion. . . . In gangrenous and all offensive sores it removes all disagreeable smell and putrescency, and may render the discharge innocuous to the contiguous living and unaffected tissues. In its diluted state, therefore, it is a great boon to patients laboring under that class of disease.

Mr. Heath, house-surgeon of the Infirmary, has used it with two parts of water as a lotion in sloughing wounds, and has found that in a short time after its application, it entirely arrests the sloughing process, and produces a healthy appearance.

Dr. Whitehead has used with advantage Dr. Robert Angus Smith's solution of sulphites and carbonates of lime and magnesia.

In July, 1859, M. Velpeau drew the attention of the French Academy of Sciences to the value of the mixture of coal-tar and sulphite of lime, of MM. Corne and Demeaux, in the healing of ulcers and other offensive wounds; and it may be added, that this mixture was used with great advantage in the French army, after the great battles of Magenta and Solferino.

In the following month I forwarded a note to the French Academy, pointing out that from experiments I had made with the various substances existing in coal-tar, it was highly probable that carbolic acid was the active agent of the coal-tar used by MM. Corne and Demeaux; and that much more certainty might be expected if that acid were substituted in their mixture, for the composition of coal-tar varies according to the nature of the coal, and the temperature employed in its preparation. I also suggested that it was probable that the powerful antiseptic properties of carbolic acid prevented the decomposition of the adjacent parts, and thus tended to restore the wounds to a healthy state, and to remove the cause of infection. Before quitting this part of the subject, I beg again to call attention to a fact which I have already published in one of my papers, namely, that the additionof two or three drops of this acid to a pint of freshly-made urine will preserve it from fermentation or any marked chemical change for several weeks.

I have also applied it lately to foot rot, which annually carries off large numbers of sheep; and I have been given to understand that the remedies hitherto adopted in this disease have been only partially successful. I think that if my experiments are further confirmed it will prove a great boon to the farmers of this country.

This acid has also been applied by me, during the last twelve months, to preservation of gelatine solutions and preparations of zinc made with starch, flour and similar substances, and of skins, hides and other animal substances. In fact, its antiseptic powers are so great that it is the most powerful preventive of putrefaction with which I am acquainted. It appears also to act strongly as an antiferment; for I have proved on an extensive commercial scale that it prevents (as stated by me in a paper published in 1855) the conversion of tannin into gallic acid and sugar. It also arrests lactic fermentation. I am now engaged in a series of experiments to discover if that power extends to alcoholic, butyric and acetic fermentations.

The Pembroke (Me.,) Iron Works are turning out work for the government. Messrs. Wadsworth, the proprietors, employ about 300 men. During the two months, ending December last, there were turned out at these works 13 tuns billets, 107 tuns scrap billets, 1,177 tuns puddled bars, 1,074 tuns manufactured iron, 1,527 casks nails, 31,500 lbs. rivets. Of the manufactured iron, about 332 tuns were for various navy yards. During the month of January about 3 tuns of iron were manufactured for gun barrels. At present great activity prevails at the works, and men are employed night and day.

Cultivating Tobacco.—To grow this plant in our more Northern climate, it is necessary to start the plants in a hotbed, similar to tomatoes, and transplant to the field or garden, when the weather becomes sufficiently warm. A small space would hold many thousand plants. The seeds are very minute, and in sowing, care must be used not to scatter it too thick, which, however, may be rectified by thinning when it comes up. Another very important point, with such small seed, is to be sure it is not sown too deep—only soil enough to barely cover the seed is required; if too deep, "ten to one" if it comes up at all.

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THE AFFINITY OF THE HUMAN MIND WITH THE DIVINE.

A LECTURE BY PROFESSOR AGASSIZ.

[Reported for the Scientific American.]

The last lecture of Professor Agassiz's course was delivered in the Academy of Music in Brooklyn, on Sunday evening, Feb. 23. It was announced by the trustees that at some future time they hoped to have another course on a different subject by the same lecturer. The announcement was responded to by general applause. The lecturer said :—

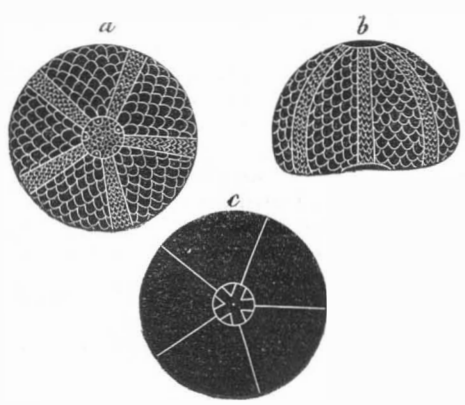
At my last lecture I showed that the animal creation is formed upon a plan proving the existence of an intelligent Creator. I now propose to show that the intellect of the Creator is of the same nature as our intellects. That the finite mind of man differs only in degree from the infinite mind of God. In illustrating this from zoology I shall take the simplest form of animals.

I have already explained that all radiated animals are constructed upon the plan of the parts being disposed about a vertical axis. Now if the problem were presented to any human mind to construct an animal upon this plan, what would be the simplest mode of proceeding? It would be the same as that which has been adopted by the Creator. This is not supposition. I asked one of our most eminent mathematicians what would be the simplest form of the parts for the construction of a symmetrical figure around a vertical axis. After considering the subject he replied that the form would be that of a wedge. He made this answer purely from mathematical considerations, as he knew nothing about zoology. This is the form which we find in nature. It is illustrated by a melon or by this orange. If I take off the peal in this way, and tear the orange apart, you all know that the pieces are in the form of wedges—vertical wedges they are called by mathematicians.

[The lecturer explained that all classes of animals belonging to the order of the radiata are constructed upon the plan of the disposition of the several parts around a vertical axis; similar to the structure of an orange in which the thin edges of the wedges occupy the line of the vertical axis. He then continued.]

Now let me be more particular, for you have taught me by your attention that I may enter into very minute particulars. I wish to show that when the Creator modifies this general plan, he does it by the same simple and direct devices which would be employed by a human intellect; only that they are more simple and direct than would be conceived by the genius of man. The affinity of our minds to the divine, is shown in the fact, that when we discover these designs we are able partly to appreciate the wisdom which formed them.

Among the higher forms of radiated animals are two classes, the sea urchins and the star fishes, which differ very much from each other in external appearance, but which on close examination are found to be simple modifications of the same plan of structure. I will draw upon the blackboard three views of the sea urchin, a view from above, a profile, and a view from below. This (*a* in the cut) is the view from above, this (*b*) is the profile, and this (*c*) is the view from below. Looking upon the upper surface of the animal,



we see in the center a circular space from which radiate five rows of small plates, the spaces between being occupied by large plates. In the circular space, alternating with the rows of small scales, are five large plates, each pierced with a hole in which is an eye. The remainder of the circular space is occupied with small plates. In the center below is the mouth surrounded by five jaws. The profile view (*b*) shows the radiating rows of small plates extending from top to bottom. Through the holes in the plates the spines protrude which are the organs of locomotion.

The star fish in its external form bears very little resemblance to the sea urchin, yet by a close examination we shall find that its structure is but a simple modification of that. The starfish has five arms radiating in this manner. [We gave an engraving last week.] The upper surface of these arms is all covered with small plates, while the mouth and the organs of locomotion are all below. Each arm has an eye at the extremity. Now a simple expansion of the sea urchin produces the star fish. I will illustrate it with the orange. Before being cut it will represent the spheroidal form of the sea urchin, and if I open the peal in in this way, I have a star. The eyes you see would be carried to the extremities of the arms, and if the interior of the orange was expanded with the bark, all of the organs would be carried below, precisely as we find them in the star fish.

If we examine the several species of any other order of animals we shall find that the great variety is produced in the same way by simple modifications of the original plan. Take for instance the articulates, which are composed of a number of rings connected by joints or articulations. The simplest of these is the worm which is formed of rings without any appendages. But worms of the next higher order have a little appendage to each ring, and we shall find if we examine closely that the external organs of the higher classes of radiates are merely modifications of the appendages to the rings. [The lecturer then explained that the fins at the lobster's tail, the paddles under the tail, the legs, the claws, the jaws, and the feelers are all modifications of appendages attached to the several rings that make up the creature's body; each successive step in the change constituting but a slight variation from the preceding.]

The same law prevails through all the species of the vertebrates. And all of these modifications are wise changes to adapt the new species to circumstances different from those of the species that preceded it. They bear the evidence of intelligence. The supervision exercised by the Creator over His works is that of the intelligent engineer who alters the working of his machine to bring forth new products, and not that of a mere manufacturer of a machine, who after it is once constructed, allows it to run blindly forward by its own forces. This intelligence has its highest manifestation in the creation of the human mind, which is formed in the image of our Creator. The proof that we are formed in His image is in the fact that by a study of His works we are able partly to comprehend the plan upon which they are made.

Effects of Coal Gas Upon the Animal System.

A paper interesting to almost every person was lately read on the above subject, by Dr. C. B. Aldis, before the Royal Medical and Chirurgical Society, London. He stated that he was induced to investigate the question in consequence of the examination of gas, as to its purity, now forming an important branch of the public health. He also wished to ascertain wether cannel coal gas destroyed life sooner than common gas.

A rat was first killed, in order to compare the internal organs with those of others destroyed by the gases. The eyelids were closed; the lungs collapsed, and of a whitish color; both ventricles of the heart contained black coagulated blood.

Six experiments were then made—two with cannel, coal gas, three with common, and one with foul gas. The rats were placed under a glass vessel, into which the gases were passed. They soon began to gasp, and became insensible; and, after lying motionless for a few seconds, convulsive movements occurred, upon which death ensued.

The eyes were open, and projected; the outer surface of the skull was exceedingly red in all that were examined, and dark fluid blood escaped from them, when the head was opened; the vessels on the surface of the brain were pinkish, and some empty; the substance of the brain pale; the lungs collapsed, and of a pinkish color; the heart distended with dark fluid blood; congestion of the abdominal veins.

The eyes of the rat destroyed by foul gas did not project so much, and, on opening the body, a strong smell of sulphureted hydrogen escaped. The brain and lungs were much congested, and of a brownish color; the heart greatly distended with dark fluid blood—the auricles being nearly black; the abdominal veins gorged with black blood.

The rats compelled to breathe cannel coal gas died sooner than those exposed to the influence of common gas. Mr. William Bloxam, Jun., had favored the author with the account of a fatal case of poisoning by coal-gas. The man (a gasfitter) was found dead on the top of a pair of steps, in a closet, in a sitting posture. He should have been doubly cautious in his mode of making the connexion of the pipe with the meter, when it is considered that his head was at the upper part of the closet, on a level with the fanlight over the door, for, while the gas escaped, this part formed a kind of gasholder. The deceased, having become insensible, was unable to lower his head beneath the frame of the fanlight; or, had he but struggled and fallen, his life might have been spared.

The paper concluded with an account of further experiments, conducted in the same manner as the foregoing, except that the animals were rendered insensible only—four being afterward exposed to fresh air, another to the action of ammonia and fresh air, and the sixth placed under a glass filled with oxygen. The animals exposed to fresh air recovered more quickly than when other means were adopted. Persons therefore who are found rendered insensible by inhaling such gas should at once be carried to the fresh air as the quickest and best means for their recovery.

THE CHEMISTRY OF COAL.

Number VI.

THE COAL-TAR DYES.

The atom of benzole is composed of twelve atoms of carbon and six of hydrogen, C_{12} H_6. If strong nitric acid, NO_5, is mixed in the proper proportions with benzole, the following chemical changes take place. One atom of the oxygen in the nitric acid combines with one atom of the hydrogen in the benzole to form an atom of water, reducing NO_5 to NO_4, and we have left C_{12} H_5 NO_4, which is called nitro benzole. This, when crude, is a reddish liquid, but by being submitted to one or two distillations its color is changed to a pale yellow. Distilled nitro benzole has an agreeable odor, resembling that of bitter almonds, and a density much greater than that of water.

Now, if nascent hydrogen is brought in contact with an atom of nitro benzole, all of the oxygen combines with the hydrogen to form water; and two atoms of the hydrogen are added to the five already in the combination, and we have C_{12} H_7 N, which is aniline. This, after being purified by one or two distillations, presents itself as an oily liquid. It is white, when first obtained, but soon becomes yellow, rose tinted and red. It is reddened by the absorption of oxygen, and the more oxygen it receives the redder it becomes. The desired tint is produced by adding a suitable oxidizing agent.

To repeat :—

Benzole.....C_{12} H_6
Nitro benzole .....C_{12} H_5 NO_4
Aniline.....C_{12} H_7 N

And by the addition of oxygen we have Solferino, Magenta, &c.

NOMINAL HORSE POWER OF HIGH-PRESSURE ENGINES.—Multiply the square of the diameter of the cylinder in inches by the pressure on the piston in pounds per square inch, and by the speed of the piston in feet per minute, and divide the product by 120,000; the quotient is the power of the engine in nominal horses power. If the pressure upon the piston be 80 lbs per square inch, the operation may be abbreviated by multiplying the square of the diameter of the cylinder by the speed of the piston, and dividing by 1,500, which will give the same result.—*Bourne.*

ALLOY OF COPPER AND PHOSPHORUS.—The compounds of phosphorus with copper possess several valuable properties. It is found that phosphorus (which is so detrimental to iron) when contained in copper, in the proportion of from 2 to 4 per cent, imparts to that metal very considerable tenacity and hardness. Ordinary gun metal bears an average strain of about 5,000 lbs. on the square inch, while copper containing a small proportion of phosphorus will bear a strain of 348 or 50,000 lbs. on the square inch.

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Correspondence

Brown Stone for Building.

MESSRS. EDITORS:—An article in the SCIENTIFIC AMERICAN of January 11, 1862, on "The Brown Stone of our Houses Crumbling to Pieces," uncorrected will have a tendency to do a great injury to one of the best building stones in the country. I say nothing for Trinity Church, as that stone is from the Jersey quarries, and a very different article from the common brown stone. I inclose a document, showing that our Portland brown stone, in the year 1836, had stood, unaffected by time, one hundred and ninety years, and the same stone is still in a perfect state of preservation, making nearly two hundred and twenty years that this stone is known to have stood unimpaired.

You refer to the peeling off of scales from brown stone. This is true, and easily explained, and as easily avoided. It is now known to every worker of Connecticut brown stone, that when it is newly quarried it is full of original moisture. If at this time the stone become hard frozen it destroys its strength, and although to appearance sound, on cutting it across the grain it will appear in very thin layers, like a pack of cards. Such stone, when put in a building, will flake off, and leave the unsightly blotches now seen on many nice brown stone houses. Now, when the original moisture is once dried out of the stone it will not absorb moisture enough so as to be again affected by frost. Therefore, all your builders have to do is to see that they get a perfect article of Connecticut brown stone, perfectly seasoned before being exposed to the action of frost, and there is then no question of its durability. I am not stating anything new to the trade; all these facts are well ascertained, and it is well known that a perfect piece of Connecticut brown stone will last as long as a building is desired to stand, and I write this to correct any wrong impressions that may be acquired from reading your article. Will you please give this article a place in the SCIENTIFIC AMERICAN or substitute a better one for it. If you desire better evidence than I produce I take it upon myself to furnish it. Any one can see the stone in Hartford and get the same information I give. W. T. GLEASON.

Portland, Conn., Feb. 20, 1862.

Gravity and the Pendulum.

MESSRS. EDITORS:—The writer of the article in the last number of your journal, entitled "Gravity and the Pendulum," and signed J. C. B., undertakes to controvert the well-known truth that the force of gravity is greater at the poles than at the equator. A few words will suffice to show that he was as far from understanding the subject on which he wrote as were those correspondents of whom you speak, who thought they could show a fallacy in the philosophy or an error in the received facts of science.

The fallacy in the argument of J. C. B. consists in the assumption that an equilibrium of the ocean at the poles and the equator can only subsist when the force of gravity at its surface is equal at those points. This is a mistake. The condition of equilibrium is, not that there should be an equality in the weight of the water at the surface, but an equality in the entire weights of two columns of water of equal section, one of them extending from the center to the equator, and the other from the center to the pole. Now, according to J. C. B., the column extending to the equator is thirteen miles longer than that extending to the pole. How happens it that this longer column is counterpoised by one thirteen miles shorter, both being of the same materials and density? It is because the particles in the former are more lightened by the centrifugal force than those in the latter are by the flattening of the poles. The effect of rotation is to diminish the weight of bodies both at the equator and the poles; but far more rapidly at the former than at the latter. The effect of the centrifugal force to lighten the water in the equatorial column is upon each particle in the direct ratio of its distance from the center, and therefore greatest at the surface. Hence the reduction of gravity at the equatorial surface is in a greater ratio, than that of the longer to the shorter column.

J. C. B. says that if the flattening process should be carried on until the force of gravity should be next to nothing at the poles, it would still be very considerable at the equator. This is an error. Long before it would be diminished one half at the poles it would be wholly neutralized by the centrifugal force at the equator.

The author of the article under consideration having shown, as he supposed, that "a pound is a pound the world around," next proposes to account for the more rapid vibration of the pendulum at the poles by showing that the direction of the force of gravity there approaches more nearly to coincidence with the direction in which the pendulum moves than it does at the equator, which he illustrates by a diagram. In this argument and illustration it is assumed that the direction of the force of gravity is everywhere toward the earth's center. This is an error. The direction of the force of gravity at each and every point of the earth's surface, is that of the radius of curvature of the earth's surface at that point. Now, since the earth is by its rotation flattened at the poles and made more convex at the equator, the radii of curvature, drawn from the extremities of the arc of vibration of the pendulum, meet at a point more distant from the earth's surface when the pendulum is at the poles than when it is at the equator. Hence, if any appreciable effect is due to the greater or less convergence of these lines, it should accelerate the vibrations of the pendulum at the equator and not at the poles. B.

New Haven, Feb. 20, 1862.

Western Pork Speculation.

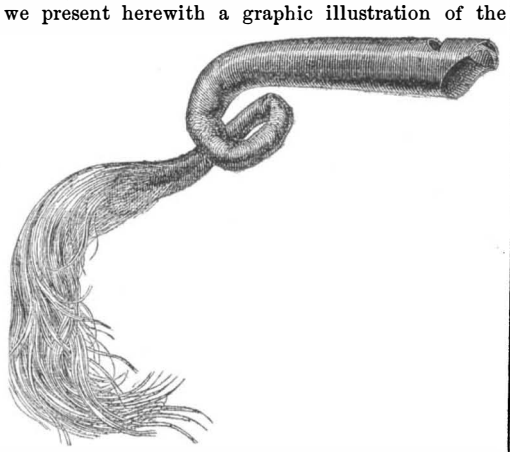
MESSRS. EDITORS:—I have the pleasure to acknowledge the receipt of a specimen number of your journal, and, in consideration of the favor, I have the pleasure of sending you the *extreme profits* of the pork speculation in Iowa during the past season. Always grateful for small favors,

I am, gentlemen, your obedient servant,

J. J. W.

Cedar Falls, Iowa, Feb. 18, 1862.

[That our readers may have a clear insight into the *extreme profits* of our friend's pork speculation in Iowa we present herewith a graphic illustration of the



shape in which it was presented to us. We have always believed in the old saying that "you cannot make a silk purse out of a sow's ear," but we have positive proof that a good whistle can be made out of a pig's tail. One may be seen at our office.—EDS.

Barometers and Hygrometers.

MESSRS. EDITORS:—The "Home-made Barometer," a description of which was copied from the *Visitor*, Franklin, N. H., on page 39 present volume SCIENTIFIC AMERICAN, is not a barometer. The principle upon which the barometer whether mercurial, aneroid, or water, depends for its action, is the actual weight of the atmospheric column under which it stands; although it is influenced by the temperature, density and amount of aqueous vapor in the air. Consequently, to get the true weight of the atmosphere, corrections obtained by observations on these elements, have to be applied. The instrument referred to, is an imperfect hygrometer, and the movements it betrays, depend upon the difference in the hygrometric state of the atmosphere, and that of the air within the air-tight cylinder, which from its isolation, is not subject to the same changes. The perforated cylinder is not a necessary appendage of the instrument, and does no more than balance the air-tight one, which could be done with the pole or a piece of lead as well. It is evident that temperature has little to do with it, because the equilibrium between the temperature of the atmosphere, and that of the air within the cylinder is effected long before the time of making your observation. With some improvements it might doubtless be made a valuable instrument for indicating the amount of moisture in the atmosphere. All the scientific hygrometers hitherto invented are defective. J. M. B.

Detroit, Feb. 12, 1862.

Expansion of Steam.

MESSRS. EDITORS:—The answer to Mr. West's figures in your issue of February 15th is a matter of very simple proportion. The work done by the smaller cylinder is thus represented:—1.0775 square feet piston × 50 lbs. pressure × 300 feet travel = 16,162 foot lbs. The corresponding work by the larger cylinder is then 2.7632 square feet piston × 19.48 lbs. mean pressure × 300 lbs. travel = 16,106 foot lbs. The latter cutting off at one-fifth, and both using the same initial steam the use of steam will then be, small cylinder, 1.0775 square feet piston × 300 feet travel = 323.25 cubic feet steam; large cylinder, 2.7632 square feet piston × 60 feet travel under 50 lbs. pressure = 165.77 cubic feet steam. Difference, as saving, 157.46 cubic feet, or 49 per cent to do the same work.

Mr. West will probably observe that we are discussing a question of economy in the use of steam, in exerting a certain effort, and that the amount of steam used in the large cylinder is determined by this point of cut off, rather than any relative displacement after the valve is shut. SAMUEL MCELROY.

New York, Feb. 21, 1862.

Electrical Phenomena.

MESSRS. EDITORS:—Some weeks since, during a severe blow the subtle fluid played some fantastic tricks. The weather was fair, scarcely a cloud visible near us, and the wind blew a small gale by way of amusement. The current came from the southwest, and traveled a little north of east. Over the mountains whence the wind came, there were heavy snow-clouds part of the time, say 20 to 25 miles distant.

During the blow, which lasted two days with intervals of intermission, stoves with pipes projecting from roofs, became highly charged with electricity; which on the near approach of persons were rapidly discharged, with sparks, shocks, and pricking sensations to the parties approaching. One lady experienced the sensations in her finger nails, another in the tips of the fingers, and one finding a convenient battery, and being in poor health, kept the current passing through her body as long as possible. The charge was strongest during the highest wind; neither stoves or person was insulated. Some of the stoves were cast-iron, others sheet-iron. All I have examined were standing on the floors of pine boards. In one instance the sparks were shaken from all the fingers at once. The facts are well attested by witnesses numerous and reliable. JOHN B. WOLFF.

Denver City, Jan. 10, 1862.

Massachusetts Manufacturing News.

The capital of the Tremont Mills, Lowell, is $600,000, all paid in; and the whole amount of debts on Jan. 31st was $119,580 81.

The capital of the Suffolk Manufacturing Co., Lowell, is $600,000, all paid in; and the whole amount of debts on Jan. 31st was $14,066 81.

The bonnet manufactories at Franklin are being put in order to resume work.

The Hampden Cigar Company of Westfield have declared an annual dividend of 8 per cent, payable from 4th inst. The aggregate value of the cigars manufactured by this company is about $125,000 annually; by the American company $50,000; and by various firms and individuals $110,000 more. About 300 persons are employed in making cigars, stripping tobacco, &c,, at Westfield.

The American Whip Company of Westfield have manufactured an elegant gold-mounted and ivory-handled whip, with Union emblems and devices, which they intend to present to President Lincoln.—*Commercial Bulletin.*

THE total product of copper in the Lake Superior district, in 1861, was 1,650 tuns.

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COSMETICS---THEIR USE AND MANUFACTURE.

Hunt's Merchant's Magazine for this month contains an article on this subject, from which we condense the following useful and interesting information. Under the title of cosmetics may be comprehended all substances or preparations for the purpose of preserving or restoring beauty. Their purpose is to change the appearance of the skin, the hair and the teeth. A countless number of preparations are used, yet they are mostly various mixtures of a comparatively small number of substances. Cosmetics were used by the daughters of ancient Judah and the classical dames of Greece and Rome, and now by the fair sex generally. The preparation of cosmetics was, at one time, a secret art of high repute, and some kinds were sold for almost fabulous prices. The preparation *le blanc de perles* and *l'huile de perles*, made in France in the last century were asserted to be formed by reducing pearls to powder in the first case, and dissolving them in vinegar in the second, making a solution. These preparations were said to possess most marvellous properties in the restoration of youth and beauty, while from their great costliness they were almost exclusively limited to the toilet of the royal household. But ere long it came to pass that these royal preparations had many counterfeits. The "pearl powders" of modern cosmeticists, generally consist of white oxide of bismuth, or equal parts of this substance, with common chalk and oxide of zinc. *Le blanc de perles* has, indeed, long since ceased to indicate the origin of the substance so called. And "*le blanc de Troyes*," "*le blanc de Mendon*," "*le blanc de Espagne*," &c., now, like *leblanc de perles* &c., only indicate *des blancs*, that is to say, white cosmetics, substances and compounds of very different properties.

As nothing is more flattering than the art of preserving beauty and adorning the exterior of our persons, it is not surprising that the use of cosmetics is one of the most universal practices of civilized nations. Indeed, nearly allied to the use of cosmetics among civilized communities are the practices of uncivilized people, in scarifying and grotesquely painting their countenances for the same purpose. Perfumery, too, enters into the category, for the sense of smell seeks gratification scarcely less than the sense of sight. Although they may for a time soften the skin, give gloss to the hair, and tint to the cheek and the lip, the time is but hastened when the lily and the rose give place to a leaden hue, and the lips of carmine to a livid blue.

Many tuns weight of toilet powders are doubtless used annually in this country alone. These are generally composed of various starches, prepared from wheat, rice, arrow root, and various nuts mixed with different proportions of powdered talc, oxide of bismuth and oxide of zinc, scented with various aromatics.

Pearl powder, according to the common acceptation of the term, consists of equal parts of oxide of bismuth and oxide of zinc, with sixteen parts of French chalk. French blanc is levigated talc passed through a silk sieve. This when well prepared is probably the best face powder made, inasmuch as it does not discolor from cutaneous exhalation or an impure atmosphere. Calcined talc is also extensively used under various names, and is unobjectionable; but it is less unctuous to the feel, and more likely to be seen than genuine French blanc.

Rouges are usually made by mixing coloring matter with either of the above-named powders. The finest kinds are made by mixing carmine with French blanc, in different proportions, say one part of carmine to from eight to twenty parts of blanc, in order to produce different shades of color, for different complexions. Rouges are sold in the form of powder, cake, and paste or pomade. Common pink saucers are made by washing safflower (*Carthamus tinctorius*) in water until th coloring matter is removed, and then dissolving ou. the carthamine, or coloring principle, by a weak solution of carbonate of soda. The coloring is then precipitated into the saucers by the addition of sulphuric acid to the solution. They are applied to the cheeks with a piece of wool. Spanish wool and Crépon rouge are made by the same process. Preparations containing lead are very dangerous. In France, where the conservators of public health constitute an intelligent portion of every municipality, prosecutions for selling fatally deleterious cosmetics are common. And it has been clearly proven by some of the most scientific men of France, that the health and lives of many distinguished artistes and women of fashion have been sacrificed by the use of poisonous cosmetics.

Milks and emulsions are nearly allied to paints. Many seeds and nuts, when divested of their outside covering, reduced to a pulpy mass by being thoroughly rubbed up with water, may be made to resemble milk. This appearance is due to the minute mechanical division of the oil of the nuts thus treated. But all such substances are exceedingly liable to decomposition, and, unless fixed by the addition of other matter, they quickly spoil. They can generally be fixed for a short time by the addition of a small proportion of alcohol and aromatic oils; and these additions, if well proportioned, may serve to render such com pounds desirable and innocent cosmetics.

Pomades frequently contain the acetate and carbonate of lead, corrosive sublimate and cinnabar; in which case they possess injurious qualities.

Hair dyes and depilatories as a class of cosmetics are perhaps far more ancient and extensive than that of any other. A recent traveler states, that, among other curiosities found in the Egyptian tombs of Sahara, was a piece of reed containing a quantity of powder such as is used even at this day by the Egyptian women to color the eyelashes. It is supposed to be the same custom as that referred to by the prophet Jeremiah, when he writes that, "Though thou rentest thy face (or thine eyes) with painting, in vain shalt thou make thyself fair." In Constantinople certain Armenians devote themselves to the preparation of cosmetics, and among the most celebrated of these is a black dye for the hair. The preparation of this dye is kept secret. It is in the form of paste, and is applied by rubbing it on the hair or beard with the hands. After a few days the hair assumes a beautiful glossy black. Most of the lotions and perfumes prepared by apothecaries and hair dressers in this country, as in France, consist of compounds holding in solution different proportions of litharge, lime and nitrate of silver. Some of the most popular of the French dyes are sold under such names as *l'Eau de Perse, l'Eau d' Egypte, l'Eau de Chypre, l'Eau de Chene*, &c. They contain from one-eleventh to one-seventh per cent of sulphuret of potassium, nitrate of silver, or quick lime with minute proportions of oxide of lead and carbonate of iron. What is sold by our own apothecaries as "vegetable dye," consists of one ounce of nitrate of silver to a pint of rose-water, put up in colored bottles. The directions for the use of this preparation are, first, to free the hair from grease by washing it with pearlash water or soda, and, after the hair is perfectly dry, apply the dye by means of a brush. It does not "strike" for several hours, but may be hastened by exposure to sunshine. Other preparations are accompanied with a mordant, which usually consists of a strong solution of sulphuret of potassium; still others, with ammonia, this substance being added to correct the otherwise bad odor of the sulphuret of potassium; it is commonly called inodorous dye. French "Brown dye" is composed of sulphate of copper, ammonia and prussiate of potassa; this is exceedingly poisonous, but said to be a very fine dye.

Depilatories are substances used to remove hairs from the surface. Ladies generally consider the growth of hair on the face, arms and neck as prejudicial to beauty. Depilatories are always composed of strong alkalies, and usually those which are the most injurious, the sulphurets of arsenic and lime. *Le Rusina des Orientaux*, which is one of the most esteemed of these preparations, consists of a solution of quick lime and orpiment (sulphuret of arsenic), and a test of its good quality on preparation is, that it will remove the barbs of a feather. It is, indeed, a powerful caustic, and its use requires great circumspection. An analogous preparation is generally kept by our apothecaries, and is in common use by hair dressers. The formula for its preparation is: best lime, slaked, three pounds; orpiment, half a pound. Mix by means of drum sieve. Preserve the same for sale in well corked bottles. Directions for use: mix with a sufficient quantity of water to render it of creamy consistence, lay it over the hairs to be removed, for about five minutes, or until the smarting produced by the application renders its removal necessary.

Tooth powders, soaps and washes, when properly constituted, greatly assist in preserving a healthy condition of the teeth, and therefore contribute to the act of mastication, and so promote healty digestion. The ill effects resulting from the accumulation of "tartar" on the teeth is well known to most persons; and in certain states of the system, the secretions of the mouth are also well known to exercise an injurious effect upon the teeth. The daily employment of a cleansing dentifrice will not only remove the oftentimes injurious remains of food, but will also generally prevent the accumulation of tartar or other injurious secretions.

Cosmetic Soaps are usually made by remelting the common curd soap of commerce and mixing with it aromatic and coloring substances, according to the quality required. The favorite variety of toilet soap, supposed by many to be made of the oil of sweet almonds, and therefore called almond soap, is generally made according to the following formula: Finest curd soap, 1 cwt.; finest oil soap, 14 lbs.; finest marine soap; 14 lbs.; otto of almonds, 1½ lbs.; otto of cloves, ¼ lbs. otto of carraway, ½ lb. First melt one-half of the curd soap, and then add the marine soap; when this is well "crutched" (stirred in), add the oil soap; and finish with the remaining curd. When the whole is well melted and thoroughly mixed, add the perfumes, quickly mix them, and turn into the molds. The finer qualities of scented soap are made by adding the perfume after the melted soap has become nearly cold. Honey soap is made of yellow soap and fig soft soap, scented with the otto of citronella. It contains no honey.

Finally, in the choice of cosmetics, of whichsoever class, those known to be inert should always be preferred to those of doubtful properties, however agreeable to the senses. And it should constantly be borne in mind, that whatever is a foe to health is an enemy to beauty.

A Thrifty Scotch Workman.

John Andrew recently died at the Carron Iron Works, Scotland, at the age of 78. John was a remarkable specimen of a hardworking, frugal-living, canny Scotchman. For upward of sixty years he had been connected with the Carron Iron Works, during which time he had succeeded in amassing a princely fortune for a working man. For about the last five years he had retired from labor. His department in the works was that of a foreman iron dresser and letter cutter of loam goods, which, in the days of the late Mr. Joseph Stainton, and in those of the late Mr. J. Dawson, was very lucrative. This may be inferred from the fact that the deceased, in the course of his life, massed about £10,000. His habits of living were unusually moderate. He was never known to spend a single farthing on luxuries, prefering, to everything,

"The halsome parritch,
Wale o' Scotia's food,"

and such primitive fare; and it was deficient neither in bone-forming, flesh-forming, or health-giving qualities. It was said, however, when John was alive that his frugality extended to niggardliness. We have it on excellent authority that about eight years ago, when his wife died, he asked permission of his employers to attend her funeral, and although at that time worth £6,000, he actually returned to work immediately after having paid the last respects to the remains of his partner in life. His anxiety to pursue his daily avocations was in order to secure the full day's pay. It is further said that, despite his wealth, he once craved one of his relations for a halfpenny which was owing him, so scrupulously exact was he in his monetary transactions. When buying herrings he used to weigh one in each hand so that he might buy the heaviest. The most remarkable anecdote we have heard of him is the following:—About twenty years ago he chanced to take ill, and, as he seriously thought he was dying, bethought himself how matters stood with reference to futurity. Evidently wishing to atone for his earthly deficiencies, he made a handsome donation (something about £250) to the Rev. Mr. Welch, late of the West U. P. Church, for the purpose of establishing a native teacher in Caffraria. Regaining health, he demanded back the sum. It is not known exactly how his wealth will ultimately be distributed. His heir-at-law is a younger brother. According to report a large sum has been made over to Bible societies and colonial missions. He had such a wonderful reverence for the first sixpence he ever earned that he kept it for sixty years.—*Falkirk Herald.*

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Improved Portable Clothes Bar.

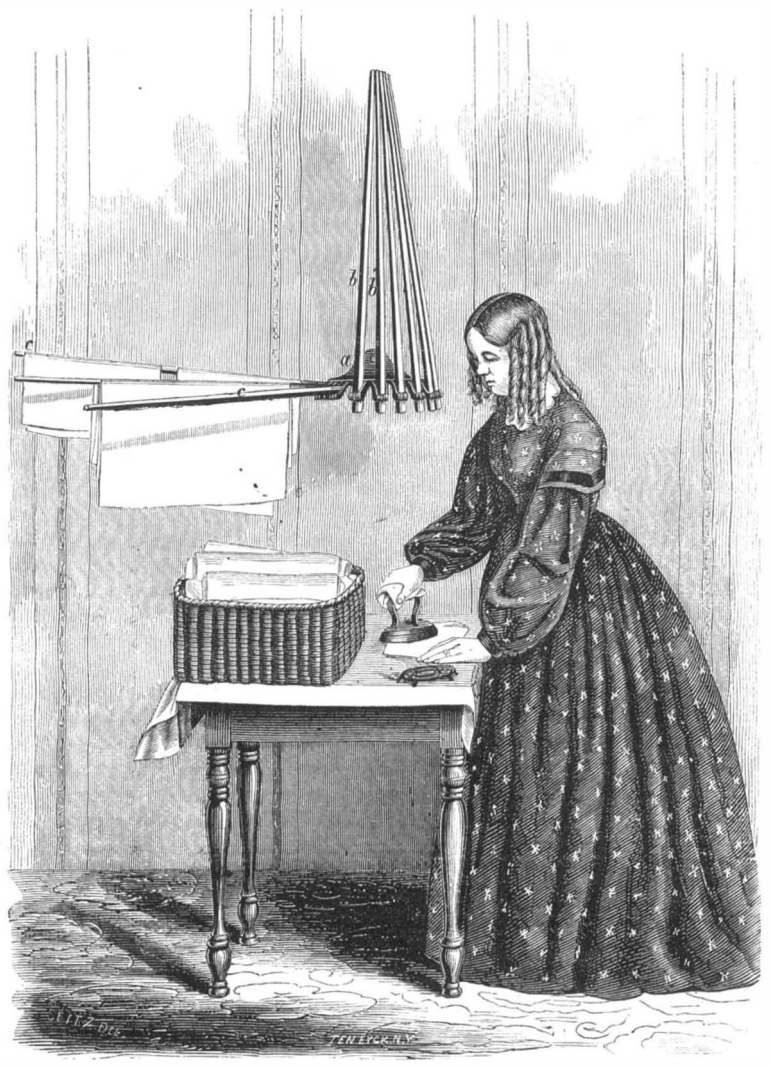
The accompanying engraving represents an exceedingly compact and convenient contrivance for supporting clothes to be dried after washing.

A semicircular bracket, *a*, is secured against the wall. This bracket has stirrups cast upon its lower edge of a proper form to receive the larger ends of the bars, *b b*, and *c c*. These bars are pivoted to the stirrups in such manner that they may be turned up against the wall in the position represented by the bars, *b b*, or turned down into the horizontal position, shown by the levers, *c c*.

The ends of the bars extend inward beyond the pivots so that when they are turned down into a horizontal position they will require no support at their outer ends. When turned up they incline inward from the perpendicular, and therefore do not require to be secured against the wall at their upper ends.

This apparatus will be found particularly convenient for drying clothes in the house. It will be seen that any required number of the bars may be brought into use, and those which will be most out of the way, while the others remain turned up against the wall.

The patent for this invention was granted, through the Scientific American Patent Agency Feb. 18, 1862, and further information in relation to it may be obtained by addressing the inventor, Hosea Willard, at Vergennes, Vermont.



WILLARD'S PORTABLE CLOTHES BAR.

India Rubber Patent Extension.—Chas. Goodyear, Jr., executor of Charles Goodyear, deceased, has applied for the extension of a patent granted to said Charles Goodyear, April 25, 1848, for an improvement in making hollow articles of india rubber. The case is to be heard at the Patent Office Monday the 14th of April next. The testimony closes on the 31st of this month.

Adulterated Tin Foil.

As tin foil is employed for so many purposes in connection with substances of personal and domestic consumption, reliable information respecting its nature and composition is of very general importance. Such information has lately been communicated to the *Pharmaceutical Journal* by Dr. J. H. Baldock, who states that his attention was directed to an examination of the subject by discovering a large quantity of lead in some tin foil which he had occasion to use. He collected a number of specimens of tin foil, sold under the name of "commercial foil," "tea foil" and "pure tin foil." He found, by chemical analysis, that common foil contained 86.93 per cent of lead, embossed foil 76.57 per cent, tea foil 88.66 per cent, and that which was sold for the pure article 34.62 per cent. Tin foil, is, therefore, a misnomer. Dr. Baldock states that this alloy is more easily acted upon than either lead or tin singly, by tobacco, snuff, tea, &c. Tin foil is usually made by inclosing an ingot of lead between two ingots of tin, and rolling them out into foil, thus having the tin on the outside and the lead in the interior. Those who manufacture it assert that it answers just as well as pure tin foil, as the lead is not exposed on the surface.

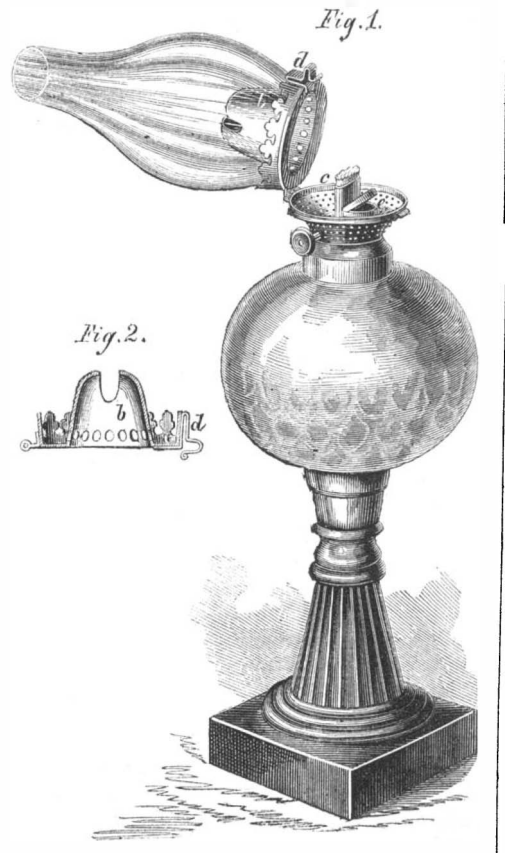
Experiments have been made at Hartford, Conn., with a steel vest fastened to a tree. An Enfield rifle made a large dent in it; a Colt's rifle, it is said, penetrated through it at a distance of fifty yards.

Business is beginning to revive in Louisville, Ky. The proprietor of one foundry advertises for one hundred finishers.

NEWMAN'S PATENT EXCELSIOR LAMP BURNER.

The object of the improvement here illustrated is to permit a lamp to be lighted or replenished with oil, or to have the wick trimmed, without the inconvenience of unscrewing and taking off the chimney; thus not only saving time and trouble, but also diminishing the danger of breaking the chimney.

The crown piece, *a*, is formed of one piece of metal with the deflector, *b*, and is attached to the burner frame, *c*, by a hinge so constructed that the chimney may be turned down into a nearly horizontal position and there held by the hinge. A spring catch, *d*, is secured to the crown piece on the side opposite to the hinge, and is so formed that it will catch under the bead on the edge of the burner frame when the chimney is in a vertical position and hold the parts in place. A thumb piece is provided for compressing this spring when it is desired to tip the chimney over.



A tube, *e*, passes through the burner frame and communicates with the interior of the lamp for filling the lamp with oil. This tube is closed at its upper end by a plug or cap which may be removed, and it is placed on the side of the wick tube opposite to the hinge so as to be accessible to the spout of the lamp feeder.

The manifest advantages of this burner are, first, convenience of lighting, day or night; second, convenience of filling the lamp; third, convenience of inserting and trimming the wick.

The patent for this invention was granted August 13, 1861, and further information in relation to it may be obtained by addressing the inventor, Carlton Newman, care of E. Wormser & Co., glass manufacturers, Pittsburgh, Pa.

Iron and Suspension Bridges

The London *Engineer* says:—In bridge construction we have the result of the Blackfriars competition to show how generally engineers have come to prefer iron, not only for railway purposes, but for those also of a vast metropolitan traffic. It has been customary to hear it said that, "for a work like London bridge granite is the only proper material." Yet there is no reason why a preference of this kind should not apply as well to Blackfriars, and even to Westminster bridges, as to that occupying the site of the oldest bridge on the Thames. If London bridge were now to be rebuilt we do not doubt that iron would be selected as the material for its construction. Greater strength with less weight can be attained with iron than with stone, and, therefore, with more security in the foundations. So, too, with equal strength, a very much lower rise may be adopted with iron, and the new Blackfriars arch will probably be the flattest in the world of any span above 150 feet.

In respect of railway bridges it is useful to note the expedition, economy and security with which two of the great Indian rivers, the Taptee and Nerbudda, have been spanned by light iron trusses, supported on hollow iron columns, founded on screw piles. The adoption of such structures for crossing alluvial rivers furnishes an illustration of the progress making in engineering.

Suspension bridges with trussed roadways are at last gaining ground. We have no doubt that the number of believers in this system of bridge construction is very much greater now than it was a year, or, certainly, two years ago. The continued favorable reports as to the Niagara bridge, together with the demonstrations of Professor Rankine, Mr. Peter Barlow, and others advocating the trussed suspension bridge, cannot have failed to induce confidence in many quarters where the principle was formerly scouted.

The principle of the inverted arch, too, has received some attention, and we do not doubt that its properties will be still further investigated.

A number of gentlemen are about purchasing Ball Mountain, Vt., with a view of trying to domesticate the moose. The entire base of the mountain is to be inclosed by a high fence. The object is to make the moose serviceable in driving singly or by pairs.

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NEW YORK, SATURDAY, MARCH 8, 1862.

WHAT CAN BE DONE FOR INVENTORS.—ADVICE GRATIS AND ADVICE FOR PAY.

For the information of our new subscribers, we would state that it is the custom, at the office of this paper, to examine models or drawings and descriptions of alleged new inventions, and to give written or verbal advice as to their patentability, without charge. Persons having made what they consider improvements in any branch of machinery, and contemplate securing the same by Letters Patent, are advised to send a sketch or model of it to this office. An examination will be made and an answer returned by early mail. Through our Branch Office, located directly opposite the Patent Office in Washington, we are enabled to make special examinations into the novelty and patentability of inventions. By having the records of the Patent Office to search, and the models and drawings deposited therein to examine, we are enabled to give an inventor most reliable advice as to the probabilities of his obtaining a patent, and also as to the extent of the claim that it is expedient to set up when the papers for an application are prepared. For this special examination at the Patent Office we make a charge of Five Dollars. It is necessary that a model or drawing and a description of the invention should accompany the remittance.

The publishers of this paper have been engaged in procuring patents for the past sixteen years, during which time they have acted as Attorneys for more than FIFTEEN THOUSAND patentees. Nearly all the patents taken by American citizens in FOREIGN countries are procured through the agency of this office.

Pamphlets of instructions as to the best mode of obtaining patents in this and all foreign countries are furnished free on application.

For further particulars as to what can be done for inventors at this office, see advertisement on another page, or address MUNN & Co.,

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HEAT, WORKING AND SUPERHEATING STEAM.

Philosophers have been divided in opinion respecting the nature of heat. One class have supposed it to be a property of matter, like gravity, and that it consisted in the peculiar vibration of its particles, The other class believed it to be a distinct substance —a peculiar subtile fluid pervading bodies. The latter hypothesis was supposed to have been proved by experiments made about sixty years ago with colored glasses by Sir John Herschel and others, and it had been taught as an established scientific doctrine. Recently the former hypothesis modified, has prevailed under the name of "The Mechanical Theory of Heat." New and important discoveries have been made respecting the modes of measuring the effects of heat and a unit of energy for it has been adopted and is called "Joule's Equivalent." It was discovered by Mr. Joule of Manchester, England, while making experiments with friction in heating water, oil, &c., that 772 lbs. lifted one foot, produced that quantity of frictional heat which elevated 1 lb. of water one degree. A pound of water raised one degree in temperature is therefore a unit of heat, and is equal in mechanical energy to 772 lbs. lifted one foot.

Heat and mechanical energy are mutually convertible, and the most perfect example which we have of this upon an extended scale, is the steam engine. The work done by a steam engine is just in proportion to the heat developed and usefully applied. In a late paper upon the theory of heat, read by Prof. Macquorn Rankine, F. R. S., before the Glasgow Philosophical Society, he directs attention to the discovery of Joule and Thomson, that when gases (such as steam) expand without performing work, scarcely any cooling effect is produced. It is therefore possible that steam may be used expansively without doing its proper quantity of work, which is equivalent to so much heat wasted. Some useful facts in this relationship have lately been published in the *Engineer*, taken from the annual report of Mr. L. E. Fletcher, chief engineer of the Manchester Association for the Prevention of Steam Boiler Explosions. He directs the attention of those who use condensing engines to the fact that these motors generally do not execute work in proportion to the quantity of steam delivered from the boilers. The loss, as measured frequently, is about thirty-three per cent. This is due to the alternating connection of the cylinder, each stroke of the engine, with the boiler at a high temperature, and the condenser at a low one—about 100° Fah. In such engines there is an alternate action of condensation and reëvaporation in the internal surfaces of the cylinder, and it is thus a considerable percentage of steam passes from the boiler to the condenser through the engine without doing useful work. This action is so silent and subtile that it had escaped detection for many years. Such a loss is of most consequence in steamships which have to carry their own fuel. It amounts to about three hundred tuns of coal on one of the larger class of steamers in a voyage across the Atlantic ocean. "The remedy for this loss," says Mr. Fletcher, "is to adopt the steam jacket for the cylinder, or superheat the steam. There is nothing new, or untried, or dangerous in either of these." Some have held up superheated steam as a bugbear, and have asserted that it destroyed the interior surfaces of cylinders, cut the faces of valves, corroded the metal and prevented proper lubrication. Actual experience has proved these objections to be visionary. Mr. Fletcher says, on this head, "I find that when superheated steam has been fully tested, no difficulty is experienced in its use, and no alteration is required for old engines to which it may be applied beyond the introduction of a slightly better description of packing for the glands. The Peninsular and Oriental Steam Navigation Company have, in many of their engines, realized an economy of upwards of 30 per cent by the introduction of superheated steam;" and a new steamer, lately built, of 2,600 tuns burthen, with engines of 400-horse power, in which steam jackets, surface condensers, and superheated steam are applied, has realized, we are told, a saving of fifty per cent in fuel compared with a steamer of like tunnage and power without such appliances. These statements claim the attention of all steam engineers and steamship companies. It has been found most advantageous to superheat the steam to about 100° above that in the boiler, when no difficulty is experienced in lubricating valves, pistons and glands. Every new economical application of steam deserves to be generally known and carried into practice.

THE GEOLOGY OF MICHIGAN.

When Michigan received her grant of public lands from the general government a princely portion was set aside for educational purposes. Instead of frittering their fund away in small portions to half-endowed, weak and semi-denominational establishments like the State of New York and other States, her rulers wisely determined to endow liberally one University for the entire State, wherein all the studies of modern high civilization should be taught, and to which all the students of the State should have free access. The various departments of learning have been filled up with competent professors as rapidly as the accumulated funds would permit.

To one of these departments—that of natural history—Prof. A. Winchell has been called, and, in addition to his college duties he has made a geological exploration of the State. The result of this work is now before us, "First biennial report of the progress of the geological survey of Michigan, embracing observations on the geology, zoology and botany of the lower peninsula, made to the Governor, Dec. 31, 1860. By authority, A. Winchell, State Geologist."

One accustomed to the rock examinations of the Eastern States, where exposures can be found in every ravine, roadside, or hilltop, can hardly appreciate the difficulties of making out a comprehensive survey of a State like Michigan, where all the rocks lie low, seldom to be seen at all, and mostly covered over with a mantle of debris, often 200 feet thick. One may travel from Detroit to Lake Michigan, across the entire State, and not see a rock *in situ*, only the ruins of the State geological structure, scattered over the plains and prairies.

To say that the work is well done under the circumstances is not sufficient praise. It is more than well done; it is a credit to the gentlemen employed, to the University with which they are connected, and to the State which ordered the survey.

We particularly notice the chapter on economical geology. The results of this portion of the work are worth more than the whole work cost, looking at it in a pecuniary view. Not only is the exact geological formation to which the brine springs belong ascertained, but it is demonstrated that the waters are strong, and in overflowing abundance.

The commercial importance of these salines may be best understood when we say that between Lake Michigan and Salt Lake, in Utah, no brine springs have been discovered. The whole northwestern country must then be tributary to this State for its supply of common salt. Brine springs have been discovered west of Michigan, but they lie in the British possessions.

The coal formation, too, has received the attention of the survey. The number of the seams of coal, their thickness, their depth beneath the surface, as well as the thickness of the entire surface, have been determined. At present the north of Michigan is covered with an immense growth of forest vegetation. But a few years will pass, and this vast amount of forest will give way before the ax of the woodman. Then will the hidden wealth of coal be sought for, to work her brine springs, to feed her locomotives, furnaces and forges, as well as to give heat to the inhabitants of the country.

To the agricultural portion of the State the value of the beds of gypsum cannot be overrated. These have received special attention in the report. Michigan is a land of sandy soil—one that feels the genial effects of sulphate of lime (plaster of the farmer), and abundantly repays the outlay of its use. Michigan is the only State of the Union which possesses a supply of gypsum, salt and coal.

We notice some points in the science of geology as settled by the investigations of Prof. Winchell.

First, That the salt and gypsum rocks belong to the carboniferous system of geologists, and in this respect differ from that of any of her sister States. In New York the salines and plaster beds belong to the silurian system. In Ohio, Pennsylvania, Western Virginia, Kentucky and Illinois the salines are included in the carboniferous system. In Southwestern Virginia the salines are with the devonian, while in Kansas and the Indian country, Utah and the Great Desert they belong to systems much more recent than the carboniferous, viz., the permian, triasic and cretaceous, if not also to the tertiary.

Second, We also notice another scientific truth developed; one which we have always maintained, that Michigan, and each geological territory, has its own history; that the great march of geological phenomena, which finally culminated in the North American continent, did not proceed with equal step over the whole wide area inclosed within the oceans. And the men who finally work out the undeveloped portion of the continent will do well to follow the example of this report, and give the independent history of each one's own portion.

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INDELIBLE WRITING.

A paper was lately read on the above named subject, before the Scottish Society of Arts, by D. R. Brown. He defined indelible writing not to mean "indestructible" writing, for that is an impossibility, but it means writing which will endure for an indefinite period of time, and also resist known chemical agents to obliterate it without destroying the paper or parchment upon which it is written.

Old writings are very permanent. An examination of these reveals the fact that they have been produced by that wonderful substance carbon. The ruins of Assyria, Egypt and Greece, unite in giving up the black carbon which the old writers used in their caligraphy. Three thousand years have passed away since some of these writings were made, and the graves of the authors are unknown, but these carbon sketches tell us what the people on the earth then did, and what they thought. Scientific men of the present day justify the use of carbon as the most indestructible writing agent, but to apply it properly it must be combined with the paper in such a manner that it will constitute an integral part of it, incapable of removal without destroying the paper.

As all paper contains carbon, it occurred to Mr. Brown that by using a platina wire made red hot by galvanism, he could use this for a pen by tracing it upon the paper, and thus develope by burning, the charcoal in the paper itself to form the writing. The first attempt to develope this idea was a failure. When the hot platina wire was moved quickly upon the paper, it burnt through it. Thicker paper imbued with various vegetable substances were then tried, but failure attended these also. Tin foil was laid upon sheets of paper, and written upon with the platina wire; it left engraved writing upon the paper, as the foil was melted out. Brown paper having produced better writing than white, various thicknesses and different kinds of it were tried, and with one particular quality very natural and perfectly indelible writing was produced. This was due to a very minute portion of tar left in the paper. The color of the paper is objectionable, but it possesses qualities of a very useful character, it being obnoxious to insects, and not liable to be affected with damp or mold.

Great difficulty was experienced in using the galvanic pen, as the wire bent frequently, and the galvanic battery was not regular in its action. From the use of heat and a mechanical agent, the attention of Mr. Brown was directed to chemical agents to set the carbon in the paper free. Two powerful substances were tried, namely, a solution of phosphorus in bisulphuret of carbon, and strong sulphuric acid. The solution of phosphorus was found to be too energetic as a small stream of it ($\frac{1}{100}$th of an inch) ejected from a fine tube, made deep black lines a quarter of an inch broad, and it penetrated through thick paper. It was therefore considered an impracticable substance. The sulphuric acid was next tried by writing with a fine tube. When written upon thick brown paper, and half an hour allowed to elapse, and the paper then held near a clear fire for about two seconds, deep black writing appeared. The sheet thus written upon was washed in water, aqua-potassa, nitric acid, and chlorine water, without effacing the writing. When put into the milk of bleaching powder (chloride of lime) however, the black writing disappeared, leaving clear cut lines in the paper resembling those made with a sharp-pointed instrument. The sulphuric acid may thus be employed to etch upon paper, and castings may be obtained from it. This hint may be useful to artists.

The result of Mr. Brown's experiments go to prove that he has not found a true indelible ink. Sulphuric acid has long been known to possess the power of charring white paper when exposed to a slight heat, and we have used it several times in the condition of a free sulphate of indigo for writing with upon white paper, but in every case it burned the paper, and, besides, it is unsafe to use. The old ink used by the Egyptians and Greeks was the very same kind as that employed at the present day by the Chinese, and which we call Chinese ink. It is formed into cakes, and is composed of the black or condensed smoke of camphor mixed with isinglass, and then dried. The camphor is burned and the smoke is caught by exposing a plate above the flame. The smoke adheres to the surface and is really very fine charcoal or carbon, A Chinese scribe carries his "ink-horn" at his girdle and when his ink fails, he replenishes the bottle by grinding a stick of the "camphor-black" in water. This is a very permanent ink, but it does not flow so freely from the pen as the common inks now used, which are made of logwood, nut-galls, and the sulphate of iron. The facilities which all civilized nations now enjoy for printing, obviates the necessity which formerly existed for an indelible writing fluid, because the pen was the only printer known to the Greeks. Printer's ink is chiefly composed of carbon, the indelible agent used in the old writing inks.

IRON PLATING---IS THE WARRIOR A FAILURE?

In recent news from Europe it is stated that the famed iron-clad frigate *Warrior*, on a late passage from England to Lisbon, Portugal, excited the apprehensions of all on board by "laboring badly in the sea." The waves washed over the decks as she lay like a log in the water, "the cabins were flooded, and in nine cases out of ten she would not obey the helm." Such statements are quite contrary in their nature to the glowing descriptions which were published respecting the *Warrior's* trial trip in Stokes's Bay, in the month of October last. On that occasion she attained an average speed of sixteen and a half miles per hour, and she was said to be the swiftest as well as the strongest war vessel ever built. It was once proposed to send her to America, and the London *Times* even threatened to have her sent into the Hudson river, and thus demand terms in the face of New York and Hoboken. From the accounts that have reached us we may now feel certain that New York and Hoboken are safe.

Before her voyage to Lisbon the *Warrior* made a trip from Chatham to Portsmouth, and in this brief voyage, it is stated, she betrayed decidedly defective qualities. In alluding to one of these the London *Times* says;—

One serious defect, of an almost if not quite irremediable character, exists in the construction of iron-cased ships as constructed at present, and is fully exemplified in both the *Warrior* and *Black Prince*. This evil is the penetration of water between the teak and armor plates. This water naturally forces for its exit a passage between the joints of the armor plates; and the opinion at present is, that nothing can remedy this under the circumstances of tongued and grooved edged plates hung on a ship's sides by through bolts. Caulking is stated to be useless, and that cannot be wondered at, considering the slung weight to be dealt with and the ship's motion at sea. But the effect of the action of the water in the grooves of the plates and upon the iron bolts can only be expected to be such that in four or five years from the time of commission each ship will require replating.

If the *Warrior* had proved to be a good and safe sea-going steamer in her voyage to Lisbon, the peculiar defect in the plates alluded to by the *Times* could be easily avoided in the construction of other iron-clad frigates. The plates of this vessel are tongued and grooved like pine planking for floors. This work was executed at great expense with the object of securing perfectly tight seams when the plates were fastened to the wooden planking inside. The matching of the plates by tonguing and grooving, reduced their strength about one-third at the seams, and was therefore objectionable on this account. But the most unfavorable sign of the utility of such a heavy iron frigate is its defective sea-going qualities. Of course these remarks are based upon common reports, and they may be greatly modified when the circumstances are more fully explained.

The defects of the *Warrior* should not be urged against the utility of iron plates for war vessels. Our Western gunboats have fully demonstrated the great benefits arising from iron plates of moderate thickness. In addition to the information which we gave in the last issue of the Scientific American, the St. Louis *Democrat* states that the plating of the flag boat *Cincinnati* was very efficient. In the attack upon Fort Henry one of the largest shot struck the iron-clad wheel house, producing a fearful concussion, but it only indented the plates and did no further harm.

Operations of the Confederate Patent Office.

The Richmond *Dispatch* of the 11th Feb. says:—

We have a copy of the report of Rufus R. Rhodes, Esq., Commissioner of Patents, giving a history of the operations of the office under his control, and showing its condition on the 1st of January, 1862, from which we make up the following brief summary: Number of applications for patents during the past year, 304; caveats, 110; patents issued, 57; United States patents and assignments thereof recorded, 112; amount of fees received, $9,000 90; amount of expenditures, $6,188 28; excess of receipts over expenditures, $2,812 62. The patents issued were distributed among the several States thus: To citizens of Virginia, 15; Georgia, 9; Alabama, 7; Louisiana, 6; North Carolina, 5; South Carolina, 4; Mississippi, 4; Tennessee, 3; Arkanas, 2; Florida, 1; Texas, 1. Eighteen of the patents that have been allowed cover improvements in fire-arms, or other destructive implements of war, and with the view of showing that some of them have striking merit the Commissioner points to the fact that they have been adopted by the Government for use against the enemy, after trial, in preference to inventions of a similar character, which, originating in foreign countries, have received there the highest approval of scientific and military men. A considerable proportion of the mechanical improvements for which patents are sought relate to agricultural implements. It is also noted, as an illustration of the inventive genius of the South, called into action by a desire to aid the common cause, that a village schoolmaster in the State of Arkansas, has received a patent for an instrument for measuring distances without the use of logarithms or other difficult process of calculation, which, if it but fulfill the expectations of the inventor, is likely to be of immediate practical value in the adjustment of artillery to different ranges, whether in fixed batteries or in service in the field. The Commissioner is informed that the instrument is soon to be tested with guns at Nashville, and there are strong grounds for believing it will prove a complete success.

The excess of receipts over expenditures sufficiently demonstrates that the office is most prosperous in its financial department, and that it is entirely self-sustaining. The report makes various suggestions concerning the administration of the office, as well as some changes in the Patent laws, which, we presume, will receive the early attention of Congress.

It appears from the above summary of Commissioner Rhodes's report of the doings of the Confederate Patent Office, for the past year that but 304 applications were made during the whole year, which is rather a poor exhibit when the fact is taken into consideration that many of the cases were mere re-applications for patents, which were previously granted to Southern inventors by the United States government.

Lords and Locomotives.

Recently a case was tried in England in which a writ of insanity was applied for by General Windham with other rich noblemen, his relatives, against his nephew a wealthy Windham, whom they thought had rather degraded the family by marrying a girl of lower rank, and who was also in the habit of doing things very peculiar, unbecoming his high blood. One of these things was sometimes driving a locomotive, and this formed one of the specifications respecting his sanity. The case has been terminated in favor of the young Windham, and the following is the evidence of Lord Claude Hamilton, M. P., whom he obtained for one of his witnesses on the locomotive question:—

I do not consider a taste for driving railway engines a proof of insanity, and such is the opinion of many who hold a distinguished rank in society. Many years ago I joined with half-a-dozen others in studying the great motive power of modern times. We attended a course of lectures at the Polytechnic, and went into the matter as thoroughly as we could. After a time we were allowed, under proper supervision, to drive engines on railways. I must say, however, that we were not permitted to experiment with passenger trains, but were restricted to ballast and coke trains. I can assure you that it requires a good deal of skill, self-possession, coolness of head and delicacy of touch to drive a railway engine. It is decidedly an intellectual study."

More Culpable Loss of Army Horses.

In addition to the large number of horses which were lost by the improper method of placing them on shipboard, as stated by us on page 105, current volume of this paper, the Boston *Bulletin* states that 143 horses have since been killed, out of 200 shipped in the *Black Prince* to Ship Island. They had been packed on board by Col. George in pens containing ten each. These horses cost $143 each, and thus the loss to the government, in this single case, is no less than $17,875. The treatment of horses purchased for the army demands a thorough investigation.

At a late meeting of the Franklin Institute, Philadelphia, Mr. Howson exhibited some remnants of a rifle barrel, to illustrate the results of a recent dangerous experiment. The barrel was filled with cartridges, each cartridge consisting of a ball with a charge of powder, and each ball having a hole through it for the reception of a fuse. The supposition was, that after igniting the powder of the first charge, a short time would elapse before the explosion of the next charge. On igniting the first cartridge, however, the whole exploded, and broke the barrel into a thousand pieces.

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The Value of Old Coins.

Macaulay speaks of the great value of collections of coins to the historian. They verify dates, preserve the likenesses of rulers, and serve as measures of the price of labor and commodities in different ages. In all old civilized countries there arises a class of persons especially interested in the study of numismatics and the collecting of coins. An interest in this study has been rapidly extending in this country within a few years, and there are now many persons ready to pay large prices for rare old coins issued by the American colonies, or by the United States government in its early years. Recently Messrs. Bangs, Merwin & Co., sold by auction a very large collection of coins, medals and storecards, at their rooms, Nos. 504 and 596 Broadway. The audience was very large, and the competition almost unceasingly spirited for scarce American and Colonial coin. There appeared to be but few dealers present, the bidders consisting mainly of gentlemen anxious to complete their private collections. Of the foreign coin offered, a miscellaneous lot of farthings, half pennies and pennies, of the reigns of the Georges, Charles the Second and Queen Anne, sold at from 25 cents to $1. A large number of Roman coins—of the days of Constantine, Faustiana, &c., were bought at from 8 to 25 cents each.

A large number of American cents were next bought at the following prices :—A cent of 1793, now very scarce, with liberty cap legible, $2; another specimen of the same date, $2 63; a palm-leaf cent of 1793, $1 50; other descriptions, $1@$1 12; a cent of 1794, $1 87; of 1795, $1 87; of 1796, 50 cents; of 1794, 40 cents; a cent of the year 1798 sold for 30 cents; one of 1799—now the scarcest of this class of coin, $1 63. This price was owing to the poor condition of the piece, the date alone being plain. A cent of 1800—the die of which was altered from 1799—brought 30 cents; one of 1804, in good condition, $3 12—this cent has advanced about $1 during the last few months. Other cents, from 1806 to 1857, sold at from 5 to 25 cents each. A half cent of 1793 was bought at $1, and other from 1795 to 1856 at from 5 to 75 cents.

There was a spirited competition among the bidders for Washington pieces—one of which, a proof cent of 1791, brought $11; one large eagle Washington cent, of that year, brought $6 75; other cents of this class, including copies, were sold at from 20 cents to $2 50—the latter price being for one bearing the inscription "Liberty and Security," on the obverse. A small eagle Washington cent of 1795 was sold at $20. This coin is now very rare.

A Flying Eagle dollar, of 1836, was purchased at $10. A dime, of 1798, brought $1 25; of 1800 and 1803, 80 cents each.

The Colonial coin brought fair prices—a Chalmers Annapolis shilling of 1798, selling at $4, and a Massachusetts pine-tree shilling, of 1652 at $3 37; a thirteen bar cent—very rare—$4 25; a Franklin cent, of 1787, which has been designated the "ring penny," and which is now very rare, $1 75.

Several storecards, in copper, were also offered. One struck for Mott's Jwellers—the first of the kind issued in this country—sold at 90 cents.

The Grand Jury and Combustible Agents.

On the 21st ult. the grand jury in this city made a presentment respecting the causes of fires in consequence of several extensive conflagrations which have lately taken place in the city. Especial attention is directed to the danger arising from storing petroleum, the keeping of turpentine and burning fluid in tenement houses, and they direct attention to the report of Fire Marshal Baker, which was furnished by request. It says :—

Petroleum, rock oil, or earth oil, in an unrefined state possesses a large percentage of volatile and inflammable matter, which is evolved to a considerable extent at the usual temperature of the atmosphere, and is materially accelerated by a high temperature or artificial heat. When confined in warehonses or cellars, in large quantities, the evaporation from it is as explosive as coal gas when in contact with a light, thereby jeopardizing the building and adjacent property. When these oils are on fire the heat generated soon becomes intense, and the application of water appears to have a tendency to spread the devouring element. Benzine, benzole and naphtha oils, which are distilled from petroleum or earth oil, are still more inflammable and dangerous, and should be excluded by an ordinance from within the fire limits the same as gunpowder, and only permitted to be kept on sale in limited quantities."

Benzine and bonzole is one and the same liquid, and is not a product of petroleum. Petroleum, however, yields a very light eupion oil, which is as dangerous as benzole.

Our Mechanical Productiveness.

The work of preparing the statistics of the last national census for publication has so far progressed as to afford valuable information to the Committee on Ways and Means and the Treasury Department, in preparing a tax bill. The different branches of manufacturing industry have expanded marvelously since the census of 1850. In that census the cotton manufactures were set down at $65,500,687. The returns from New England alone in 1860 amount to $79,000,000. The woolen goods of the United States were estimated at $39,848,557, but New England alone in 1860 returns the value of woolen goods at $32,000,000. In boots and shoes the census of 1850 for the whole United States returned only $53,967,408; Massachusetts alone in 1860 estimates her production in this branch of industry at $46,060,000. Philadelphia returns nearly $6,000,000. The production of pig, bar, railroad and rolled iron, which in 1850 was of the value of $30,823,374, in 1860 has reached $62,055,000, having doubled in ten years. The malt liquors produced in 1850 were vauled at $5,728,508. In 1860 the amount is 3,235,000 barrels, valued at $18,000,000, or more than three times greater. The spirituous liquors in 1850 were valued at $15,770,240; in 1860 the production is 86,000,000 gallons, valued at $23,500,000. The value of the products of industry of all branches in 1850 was computed at $1,019,106,616. In 1860 it will reach $1,900,000,000, or an increase of about eighty-seven per cent! The greatest increase since 1850 is in agricultural implements, iron, malt.

Back Numbers and Volumes of the Scientific American

Volumes I., II., III., IV., V. complete, except Nos. 7, 9, and 15, of volume III., which are out of print—(bound or unbound) may be had at this office and from all periodical dealers. Price, bound, $1 50 per volume, by mail, $2—which includes postage. Price in sheets, $1. Every mechanic, inventor, or artizan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding.

We are prepared to bind volumes in handsome covers, with illuminated sides, and to furnish covers for other binders. Price for binding, 50 cents. Price for covers, by mail, 50 cents; by express, or delivered at the office, 40 cents.

SCARCITY OF GRAIN IN EUROPE.—The regular wheat crop of Great Britain and Ireland, is 164,000,000 bushels, but last year it amounted only to 96,000,000. To make up this great deficiency and supply seed for the new crop, it is stated that no less than 122,000,000 have been required from abroad, mostly from America. Of this amount it is stated that one half has not yet been obtained. The granaries of Great Britain were probably never so empty at this season of the year as now. Yet the price of wheat in London is not very high, being about $1 90 per bushel, just about the same as it was in January, 1847, the year of the Irish famine! and yet before the first of June that year, the price had advanced to $3 20 per bushel.

THE MOON'S INFLUENCE ON RAIN—From the comparison of a series of observations, continued for twenty-eight years at Munich, Stuttgard, and Augsburg by Professor Schubler, it appears that the maximum number of rainy days takes place between the first quarter and the new moon. The number of rainy days in the last of these intervals is to that in the first as 696 to 846, or in round numbers as 4 to 6. And this proportion is not only true of the twenty years taken together, but also of the separate groups of four years, which give analogous numbers; we therefore, conclude that it rains more frequently during the wane of the moon. The results maintained by Schubler received support from a aeries of observations made by Philgram, at Vienna.

UNITED STATES CIRCUIT COURT---INFRINGEMENT.

Patent for Steam and Fire Regulator.

The Clark's Patent Steam and Fire Regulator Company vs. *Charles W. Copeland*—SHIPMAN, D. J.—This was an action for damages for an alleged infringement of a patent owned by the plaintiffs, which was granted to Timothy Clark on the 21st August, 1847, and was afterwards extended. The patent was for an apparatus for regulating the intensity of the fire in the furnaces of steam boilers by the pressure of the steam generated. The apparatus consists of a flexible vessel which is expanded by the pressure of the steam, the outside of it being connected with the damper of the furnace by levers controlled by a weight or spring set to the required pressure of steam, so that if the pressure of steam in the boiler exceeds this the dampers are closed, and if it falls below the required pressure the weight or spring shall open the dampers. The effect is to maintain a uniform pressure in the boiler, save fuel and prevent explosions.

The defendant was alleged to have infringed by making and selling what is called the "Reliance Regulator," under a subsequent patent for an alleged improvement in the structure of the flexible vessel. On his part, the defendant claimed that Clark was not the first inventor of the apparatus, and he brought forward three things to establish this, viz., the float regulator, the piston regulator, and Brunton's operative thermometer, all of which were well known before Clark's patent.

It was agreed that the verdict if in favor of the plaintiffs, should be for nominal damages only.

Judge Shipman charged the jury, in substance, that the important question of the jury was, whether Clark's patent was valid; that, to make it such, the invention must be both new and useful; that a small degree of utility is sufficient to support a patent, and in this case the defendant admitted it was useful, and, therefore, the patent was valid as far as utility was concerned, thus leaving but two questions for the jury: 1. Was the invention new? 2. Has the defendant infringed?

That the invention described in the plaintiff's patent is a mechanism so organized and connected with the boiler of a steam-generator that, when properly set to a given pressure in the generator, it will automatically and promptly, by force of the pressure in the generator, open and close the damper as that pressure rises above or falls beneath the figure at which the mechanism is set.

That the patent is *prima facie* evidence that the invention is new.

That as the piston regulator and the float regulator were both known before Clark's invention, it was for the jury to say whether, in any description of them, they found this invention of Clark's; that in order to affect the validity of Clark's patent, the jury must find that the description of one of these other regulators embodies substantially the same organized mechanism, operating substantially in the same manner as that described in Clark's patent; that the plaintiff's urged that if either of these were the same as Clark's, they would have come into use as his has, and that of the force of this argument the jury were to judge.

Mr. Brunton, in his patent, describes his machine or apparatus as to be expanded by liquids only; that it does not necessarily follow from this construction of it that the apparatus could not operate by the expansive power of steam, and whether the organized mechanism which he described was substantially like Clark's, and would operate substantially like Clark's by the pressure of steam, was a question for the jury on the evidence.

That the elastic vessel in Brunton's apparatus was substantially like Clark's; but this is not of itself enough to invalidate the plaintiff's patent. Old instruments, placed in a new and different organization, producing in it different results, or the same results by a new and different mode of operation, do not prevent such newly-organized mechanism from being patentable.

That if the jury did not find such a mechanism as Clark's not only substantially the same in its parts, but so organized as that, when set in operation, it will produce substantially the same results in substantially the same way, then Clark's patent is valid, unless the change made by Clark is so obvious that it required no invention or labor of thought to make that change.

That as to the requisite degree of that invention or labor of thought, the law has no nice or rigid standard. There must be some inventive skill exercised, but the degree of that skill is not material.

That if Clark supplied to what was old some new element, instrument, or organization, and thus produced a better practical result than had been produced by the old means, he is entitled to the merit and fruits of his labor.

That as to the defendant's claim, that the hand of the engineer is a better regulator than any automatic machine, and that this is a sufficient answer to the question why these other regulators are not in use and have not attracted more attention from engineers, the jury were to judge of it in the light of the evidence as to the value of Clark's invention, and in view of the fact that the defendant, an engineer himself, has patented an apparatus having the same object.

That the jury could have no difficulty as to the question of infringement, if they found Clark's invention to be new. The mere change in the form of the flexible vessel, or the material of which it is composed, does not take it out of Clark's invention, if the organized mechanism is substantially the same and operates substantially in the same way.

That if the jury found for the plaintiffs, they must assess the damages at six cents.

The jury found a verdict for the plaintiffs.

For plaintiffs, Mr. Keller; for defendant, Mr. Gifford.

PETITIONS have been presented to Congress from shipowners and builders, requesting the passage of an act prohibiting the export of ship timber. The petitioners state that such timber is becoming scarce and high in price, owing to large orders received for it from abroad.

THE largest-sized Armstrong gun yet made is a 10-inch bore. It is intended to use 300-pound elongated shot with it.

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RECENT AMERICAN INVENTIONS.

Breech-loading Firearm.—This invention, secured to B. F. Skinner and A. Plummer, Jr., of Mystic Bridge, Conn., consists in a certain mode of applying a breech which opens and closes by a swinging movement transverse to the barrel, whereby, in the closing movement of said breech, its front face is caused to leave a slight movement toward and from the rear end of the barrel, and in its opening movement the said face is caused to have a corresponding movement away from the barrel. It also consists in an improved arrangement of a locking device for locking the breech in a closed condition, whereby great facility is afforded for unlocking it, and the re-loading of the piece, after its discharge, can be performed very expeditiously. It has also a certain improved means of applying and cocking the hammer or other device employed, in combination with such a breech, to effect the explosion of the priming.

Hoop Skirt.—This invention is intended to remedy a great defect which has existed in all the skirts previously manufactured with hoops of metal. Owing to the inflexibility of such hoops in an upward and downward direction the front parts of those hoops whose back parts are pressed down in sitting, are thrown upward, raising the front of the dress in an objectionable manner. The invention consists in so constructing one or more of the hoops of a skirt with joints, or otherwise, that while a desirable degree of inflexibility in an upward and downward direction is preserved in all other parts of the said hoops, they are made capable of an easy flexure in such direction, at convenient points on each side, to enable their front parts to fall and hang over the front of the seat when the wearer is sitting down. George Mallory, of Watertown, Conn., is the patentee.

Elevating Machine.—David L. Miller, of Madison, N. Y., has secured an invention relating to that class of portable elevating machines which are mounted upon wheels and used in clearing new-made land of stones and stumps. It consists in the manner of arranging the windlass so as to cause the strain in lifting to be equally divided upon three wheels. It also consists in the manner of operating the windlass by a worm screw and worm wheel, whereby a continuous motion is given to the windlass, producing great power, the worm screw being so arranged in relation to the wheel that it can be easily disengaged therefrom to allow the windlass to be operated with great speed when it is desired to unwind or wind up the chain preparatory to applying the power to elevate the stump or stone from its bed.

Bellows.—The object of this invention, which is particularly applicable to organ bellows, is to enable the performer or operator to increase the force of the wind at pleasure. The invention consists in the arrangement of an additional reservoir with a movable part in combination with the ordinary bellows, and connecting with the same by a suitable tube or air trunk, in such a manner that the pressure of the air acting on the movable part of the additional reservoir produces an additional pressure on the top of the bellows, and that by this application the power of the wind itself is employed to act like a movable weight put on or taken off from the bellows at pleasure. Invented by E. D. Stuart, Brooklyn, E. D., N. Y.

Enameling Jewelry.

The white enamel of watch dial plates is composed of ground flint glass, and the oxide of tin. The enamel in a pasty condition is laid upon the polished metal, and all the free moisture is absorbed by applying a dry cotton cloth to it, after which it is smoothed on the surface and permitted to become dry. It is now placed within a muffle, and subjected to a powerful heat in a furnace. Several thin coats of enamel, frequently four, are laid upon the top of one another, each fired and rubbed down with a fine file and polished with a burnisher. Blue enamel is obtained by mixing cobalt with an opaque white enamel. The protoxide of copper affords the color for red enamel.

HORSE POWER AND STEAM PRESSURE.—One indicated horse power with expansion requires per hour—

17.9 lb. weight of steam, at 10 lb. pressure.
15.5 lb. weight of steam, at 20 lb. pressure.
14.1 lb. weight of steam, at 30 lb. pressure.
13.2 lb. weight of steam, at 40 lb. pressure.
12.6 lb. weight of steam, at 50 lb. pressure.
12.1 lb. weight of steam, at 60 lb. pressure.

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING FEBRUARY 18, 1862.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

34,399.—J. C. Adams, of Baltimore, Md., for Improvement in Combined House, Bridge, Boat and Wagon Body :

I claim the described house, or its equivalent, which can be converted into the uses set forth.

34,400.—J. S. Barden, of New Haven, Conn., for Improvement in Crank and Cross-Head Connection for Steam Engines :

I claim the combination and arrangement of the flanches, o o, grooves, i i, and rail bearings, k l m, with the three friction rollers, and the crosshead, A, the whole being applied to a crank and a piston rod and to operate substantially as set forth.

I also claim the combination of the semi-tubes, F G, with the rollers when applied, and to operate within a rail frame, A, as described.

34,401.—C. H. Burgess, of Sandwich, Mass., for Improvement in Doors for Reverberatory and other Furnaces :

I claim constructing the doors of reverberatory and other furnaces, with the water space described, in combination with the arrangement of the pipes essentially as set forth.

34,402.—M. L. Callender, of New York City, for Improvement in Hydro-carbon Burners :

I claim, first, The relative arrangement of the cone, d, and the interior deflector, I, with its shield, b, for the purpose of burning hydro-carbon oils with or without a chimney in the manner specified.

Second, I claim a burner so constructed as to increase the length of its metallic connection between the flame and the body of the lamp and the wick tube, without adding materially to its height, using for that purpose, the spiral coil, B B′, on which the cone, d, is mounted.

Third, I claim the new and cheap method of forming the levers, s s′, from the metal of which the body of the burner itself is constructed by which means the springs to hold the chimney in position and the body of the burner are made simultaneously from one piece of metal.

34,403.—Paul Casamajor, of New York City, for Improved Apparatus for Making Vinegar :

I claim, first, The method of creating an artificial draft by inspiration or suction, substantially as described and for the purpose set forth.

Second, The rotary apparatus, substantially as described and for the purpose set forth.

34,404.—J. Clarke and D. French, of Syracuse, N. Y., for Improved Composition for Pavements, Roofing and other Purposes :

We claim the described composition substantially as and for the purposes set forth.

34,405.—M. C. Cogswell and A. G. Williams, of Buffalo, N. Y., for Improvement in Grain Driers :

We claim, first, the double head, c, having an air chamber, C′, and hollow journal, D, for the purposes and substantially as described.

Second, We claim the combination of the double head, c, with perforated distributing air tubes, F, for the purposes and substantially as described

Third, We claim the combination of the double head, c, hollow journal, D, distributing air pipes, F, and lifting buckets, I, with the case, A, for the purposes and substantially as set forth.

34,406.—James Collins, of Farmington, Ill., for Improvement in Cultivators :

I claim, first, The combination of the perpendicular draft rods, f f′, depending from the transverse bar, a a′, and braces, h h, extending back from the lower part of the said draft rods to the axletree, all constructed and arranged as described and for the purposes stated.

Second, I claim the combination of the clevis, g, and draft rods, f f, when constructed and operating as and for the purposes set forth.

Third, The crank levers, k k′, and adjusting nuts, x, constructed and arranged in connection with a corn plow on wheels, in the manner and for the purposes set forth.

Fourth, The combination of the cross bar, a a′, draft rods, f f′, braces, h h′, clevis, g, adjusting levers, k k′ and p p′, curved axletree, e e′, and seat, m, all substantially as and for the purposes set forth.

34,407.—Hannah D. Conrad, of Dayton, Ohio, for Improvement in Setting and Threading Needles in Sewing Machines :

I claim, first, In combination with a sewing machine, the improved needle threader and setter described, pivoted or hinged to the needle arm or bar to the needle bar socket.

Second, And in combination with the improved needle threader and setter pivoted or hinged, as described, I claim the stop, k, for the purposes set forth.

Third, In combination with the funnel, F, I claim the screw, J, for adjusting the eyes of needles of different sizes opposite the termination of the funnel.

34,408.—E. T. Covell, of New Bedford, Mass., for Improvement in Lamps :

I claim placing the slitted deflector, d, over the wick tubes, g and f, for the purpose of enabling my said lamp to produce a flat flame from a tubular wick, substantially as represented; but this I only claim when air is permitted to flow through the space within the wick tube, g, for the purpose of aiding in the production of a more perfect combustion than has ever before been produced in an oil lamp.

When a slitted deflector is placed over the tubular wick of a lamp, I also claim supporting the said deflector in such a manner that it can be turned to any desired position, independently of the wick tubes of said lamp, substantially as set forth.

34,409.—Henry Craig, of Cleveland, Ohio, for Improvement in Microscopes :

I claim the lens, E, when constructed as set forth.

34,410.—A. B. Davis and Thomas Crook, Jr., of Philadelphia, Pa., for Improvement in Corn Shellers :

We claim the angular strip, a, on the wheel, K, arranged in respect to the stripper wheels, L and L′, substantially as set forth for the purpose specified.

34,411.—G. B. Davis, of Chicago, Ill., for Improvement in Water Filters :

I claim, first, The tub or pail, A, divided into two compartments, C D, by a horizontal partition or false bottom, B, in combination with the filter case, G, perforated at its side or sides, provided with an internal perforated, cone, d, and fitted or arranged on the false bottom, B, to operate substantially as and for the purpose set forth.

Second, The combination of the partition or false bottom, B, in tub, A, filter case, G, cocks, E K, and air tube, J, when all arranged substantially as and for the purpose specified.

Third, The combination of a double-walled tub or pail, A, with the false bottom, B, and filter case, G, arranged as shown to form combined filter and cooler, as set forth.

[The object of this invention is to obtain a filter which will thoroughly cleanse water, and which will not only admit of being readily cleansed when filtering, but will not be so liable to become foul as those of ordinary construction.]

34,412.—Francis Deluce, of Boston, Mass., for Improved Centering Implement :

I claim the implement for drilling central holes, constructed and operating substantially as set forth. Also in combination with the said improvement, the means described, or the equivalent thereof, for changing the relative position of the drill.

34,413.—Augustus Destouy, of New York City, for Improvement in Sewing Machines :

I claim in a machine provided with a table or support for the material to be sewed to rest upon, and a feeding and thread controlling device. I claim the combination of the following elements constituting a sewing mechanism adapted to the manufacture of boots and other like articles, viz., an awl and a forked needle, the former for piercing the material and the latter to carry the under thread through it and a stationary thread case and a rotating hook, the former for holding the upper thread and the latter to seize and carry the under thread loop over and around the thread case so as to lock in the thread fed out from said case, the whole being arranged substantially as described to operate in the manner and for the purposes set forth.

34,414.—Wm. H. Devalin, of Sacramento, Cal., for Improvement in Rotary Engines :

I claim the combination of the pistons, H, boxes, I, rods, g, cross-heads, J, rollers, j, cams, K n, and springs, i, all constructed, arranged and operating in the manner and for the purposes shown and explained.

34,415.—Joseph Dodin, of New York City, for Improvement in Lamps :

I claim the particular shape of the plate of metal combining the mode of locking together at A, and clasping the tube at n, substantially as described.

34,416.—J. H. Doughty, of Adamsville, Ohio, for Improvement in Churns :

I claim the combination of the channels, i k, formed and arranged as described, when used in connection with the cylinder, G, piston, F′, and valve, J, arranged and operating substantially as and for the purposes set forth.

34,417.—Thaddeus Fairbanks, of St. Johnsberry, Vt., for Improvement in Platform Scales :

I claim the described application or arrangement of a fractional scale arm, H, and a movable counterbalance weight, I, relatively to the scale beam and to operate therewith, substantially as specified.

I also claim the arrangement of the superior lever, C, and the post, F, with respect to the stand or base of the platform of the scale.

34,418.—Henry Farmer, of Pontiac, Michigan, for Improvement in Vegetable and Root Cutters :

I claim, first, The use of the cylinder, C, constructed in the manner and for the purpose set forth.

Second, The employment of the sections, E, hinged and provided with knives, a a, as and for the purposes specified.

34,419.—Albert Fuller, of Cincinnati, Ohio, for Improvement in Faucets :

I claim, first, A faucet having an interior elastic tube, by the compression and expansion of which the flow of liquid may be regulated or prevented, substantially as described.

Second, The application of the conoidal tube, D, to the elastic tube, C, for the purpose of securing the latter, substantially as described.

34,420.—O. T. Gilman, of Washington, D. C., for Improvement in tools :

I claim the employment of the claw, C, in combination with hammer, A, for forming three tools in one, substantially as specified.

34,421.—E. D. Gould, of Lockport, N. Y., for Improvement in Channeling Tools for Harness Makers :

I claim a channeling tool constructed substantially as described, with the sliding knife, or knives, c d, and adjustable spring knife, e, operating substantially in the manner set forth.

I also claim constructing the knife, e, with a segmental spring shank in combination with the adjusting screw, n, substantially as and for the purposes set forth.

34,422.—J. D. Green, of U. S. Army, for Improvement in Breech-loading Firearms :

I claim the combination of the sliding and revolving plunger or breech plug, I, with the rod, K, when the hand lever, L, by which the breech plug is revolved, is attached to the rod, as set forth.

34,423.—J. J. Hirschbuhl, of Louisville, Ky., for Improvement in Military Ammunition Box :

I claim the described ammunition box having an apartment, E, for a powder flask and separate boxes, B C D, attached to one side by hinges so as to open outward, for the reception of balls, percussion caps and cartridges, when arranged in the manner and for the purpose described.

[An engraving of this invention will soon be published in the SCIENTIFIC AMERICAN.]

34,424.—William Hodgson, Jr., of Philadelphia, Pa., for Improvement in the Manufacture of Graduated Glass Measures :

I claim the forming of graduated glass measures and the graduations thereon at one operation in a press mold so constructed, marked and shaped that all vessels made in the same mold will be precisely alike as regards form and capacity, and will have graduations so arranged in respect to that form and capacity that the same accurate measurement may be made of all vessels alike, as set forth.

34,425.—M. W. House of Cleveland, Ohio, for Improvement in Electric Baths :

I claim, first, The insulator, J, for the support of the basket, b, for the purpose described, in combination with the insulated rotating sods, f, and traversing holes, e, when arranged and operating as and for the purpose specified.

Second, I claim the head plate, C, when hinged to the insulator, J, in such a manner that the distance between the plate and head of the patient can be increased or diminished, for the purpose of concentrating or diffusing the electrical current through the part exposed to its action.

34,426.—G. W. Howard, of Pontiac, Mich., for Improvement in Oil Tanks :

I claim constructing an oil tank with an open bottom, in combination with buoys or floats, substantially in the manner described, whereby the upper edge of the tank is always kept above the surface of the water, and the tank may readily be floated from place to place, or rise and fall with the tide, as described.

34,427.—Edgar Huson, of Ithaca, N. Y., for Improved Machine for Raising Carriages :

I claim such a combination of lever loop joints and ratchets for a carriage jack, as that when the weight is raised and the lever pressed down against the standard the slide is supported and upheld without any fastening, by the support of the loop, which falls outside the joint, D.

34,428.—T. A. Jenckes, of Providence, R. I., for Improved Water-Proof Fabric :

I claim the fabric in which flocks or fibers and india rubber or other allied gums are combined with cloth or other base by means of pressure, so as to become integeral portions of the new napped water-proof fabric, substantially as described; the same being a new manufacture.

34,429.—G. R. Kelsey, of West Haven Conn., for Improvement in the Manufacture of Buckles :

I claim a buckle in which the bow and loop is made of one piece of wire, when the ends of the cross bar, c, are clinched around the opposite parts, a and b, of the bow and loops, to strengthen the buckles, as described.

34,430.—Rhodolphus Kinsley, of Springfield, Mass,, for Improvement in Tompion for Firearms :

I claim, first, A tompion consisting of a wooden pin, split in two parts throughout a portion of its length, and having a spring of metal, rubber or other suitable substance inserted between these two parts to force them against the bore of a gun, substantially in the manner and for the purpose described.

Second, Forming the pin or shank part of the tompion smaller at the middle than at each end, for the purpose and in the manner substantially as set forth.

34,431.—A. Kline, of Philadelphia, Pa., for Improved Match Safe :

I claim the match safe, A, having its lid, B, applied and arranged to operate in relation to the same in the modes described and set forth for the purpose specified.

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34,432.—I. W. Knapp, of New York City, for Improvement in Bakers' Ovens :

I claim combining with the fire chamber of the mechanical bake oven, known as the "reel oven," a flue or passage way, provided with a suitable damper, leading from the fire chamber to the chimney, and so arranged with relation to the perforated bakihg chamber, containing the reel and bread pans, as to conduct smoke, gases, &c., (heretofore allowed to pass into the baking chamber,) directly from the fire chamber to the chimney, substantially as described.

34,433.—T. S. Lambert, of Peekskill, N. Y., for Improvement in Camp Stoves :

I claim the combination of the sectional cylinders with the draft pipes or flues, C D H, constructed as described, and with the smoke flue and cover, substantially as set forth.

34,434.—R. S. Lawrence, of Hartford, Conn., for Improvement in Forging Apparatus :

I claim an auxiliary weight and belt combined with the pulley or drum of a drop, or with the belt or strap, or other appliance, used to raise the drop weight, for the purpose set forth.

34,435.—John Le Ferre, of Charlestown, Mass., for Improved Metal for Sheathing Ships :

I claim a sheet of copper or of copper alloy, coated with tin, substantially as set forth.

34,436.—Jacob Longyear, of Grass Lake, Mich., for an Improved Boring Machine :

I claim the arrangement of the independently-adjustable carriage bars, I I, with the carriage, L, adjustable stop, M, and the series of boring bits, H H H, all as shown and described.

[This invention relates to a machine which is designed for boring a number of holes simultaneously, or at one operation, such, for instance, as are required in blind stiles to receive the tenons of the slats. The object of the invention is to facilitate this kind of work and reduce the cost of construction of the manufactured article, by not only expediting the boring operation, but by also dispensing in this department of work with superior mechanics hitherto required.]

34,437.—Henry Lyon, of Brooklyn, N. Y., for Improved Cork Sole for Boots and Shoes :

I claim the improved waterpoof cork sole made from fine, or granulated cork, as set forth in this specification.

34,438.—M. M. Mackerley, of South Salem, Ohio, for Improved Corn Planter and Lime Spreader Combined :

I claim the box, F, the plow, N, the valve, D, the box, H, the eccentric, Q, the connecting-rod, c, pins, e e, valves, I, box, J, and dog, f, the whole to be constructed and arranged with respect to each other, substantially in the manner described for the purpose specified.

34,439.—Almeron McKenney, of Maumee, Ohio, for Improvement in Grubbing Machines :

I claim, first, The employment of the hollow axle, A, constructed as specified, and provided with the flanges, a a, and projections, b b, as and for the purpose specified.

Second, The employment of the wheels, B B, and the hollow levers, C, as constructed and used in connection with the hollow axle, A, for the purpose specified.

Third, The combination of the ratchet hooks G G, the rachet wheels, E E, the lever, C, the bars, J J, and counter balance, K, constructed and arranged as specified.

Fourth, The metallic jaw, e, provided with flanges, and a slot for longitudinal adjustment, when bolted to the lever as and for the purpose specified.

Fifth, The employment of the clevis, constructed in the manner described and used with the axle provided with lugs, as and for the purpose specified.

Sixth, The employment of the bolt, i, with eccentrics and handle in connection with the levers and ratchet hooks, to prevent the wheels from becoming locked too soon, substantially as specified.

34,440.—D. L. Miller, of Madison, N. J., for Improved Elevating Machine :

I claim the worm screw, K, and manner of arranging the boxes, f g, of the same, so that it can be easily disengaged from the worm wheel, J, in combination therewith, and with the windlass, L, draft chain, i, box frame, I, inclined stud. G, and brace, H, platform, A, and longitudinal beams, a a′ b b′, the whole mounted upon wheels and arranged in the manner and for the purpose set forth.

34,441.—Joseph Miller, of Paris, Ohio, for Improvement in Horse Rakes :

I claim, first, The arrangement of the protuberances, K K′, straps or chains, i j, rollers, M, spur, N, and stops, L, in connection with the foot levers, I J, to facilitate the elevation, depression and holding down of the rake, as explained.

Second, The combination of the standard, G, seat, H, and vertical foot lever, I J, the levers being mounted upon the standard, G, the latter secured to the axle, A, and all arranged in the manner and for the purpose shown and explained.

34,442.—C. R. Morehouse, of Cardington, Ohio, for Improvement in Rat Traps :

I claim, first, The arrangement of the rod, G, spring, d d, plate, I, and trigger, J, as and for the purpose specified.

Second, The arrangement of the doors, C C, the bars, H H, and the rod, G, in the manner and for the purpose specified.

34,443.—John Norton, of Rosherville, England, for Improvement in Mode of Splitting Stumps of Trees, Timber, &c.:

I claim the general system or mode of spliting stumps of trees or large blocks of timber, by the of use cartridges of percussion powder, as described.

34,444.—James Old, of Pittsburgh, Pa., for Improvement in Pumps for Deep Wells :

I claim the use of a hollow piston-rod or pipe, extending through the lowest valve, as well as through the upper valve or plunger of pumps, and furnished with a valve at top of the hollow piston rod or gas pipe, constructed and arranged substantially as described, for the purpose of allowing of the escape of gas or fixed air from the bottom of deep wells, without interfering with the operations of the valves of the pump.

Second, Also the combination of a hollow piston rod for the plunger of a pump passing through all the valves of the pump cylinder, with a flexible tube and valve at the top of the hollow piston rod, constructed substantially as and for the purpose described.

Third, Also the use of a check valve seated in the pump chamber, directly above and in addition to the ordinary upper and lower pump valves, for the purpose of sustaining and relieving the plunger of the pressure of the column of oil, or other liquid, in the pump tube above the valves, when there is a partial vacuum in the pump chamber on the up-stroke of the plunger.

Fourth, Also the use of an air-vessel attached to piston rod of a pump, for the purpose of checking the too rapid descent of the plunger and of keeping up the upward flow of the column of water, oil or other liquid in the pump tube, above the valves, during the descent of the plunger, substantially as described.

34,445.—C. H. Packard, of North Bridgewater, Mass., for Improved Clothes Wringer :

I claim, in a wringing machine whose upper elastic roller is supported in a rocker frame, the arrangement of the springs, K K, between the feet, B B, and the arms, c c′, in combination with so constructing and applying the rocker frame that its upper end or arms, f f′, may both be elevated at the same time, or either of them, as may be desirable, whereby the said springs and rollers are caused to operate, substantially in the manner as set forth.

34,446.—Oscar Paddock, of Watertown, N. Y., for Improvement in Operating Dampers in Stoves :

In combination with a stove, when the same is provided with two upright pipes, C C′, communicating with and sustaining horizontal flues arranged in relation to each other, substantially as described, I claim the arrangement of the valves, J J′, operating within the said pipes, so as to open and close simultaneously by means of connecting rods, or their equivalents, for the purposes set forth.

34,447.—W. H. Pierce, of East Cambridge, Mass., for Improvement in Guards for Lanterns :

I claim the band or ring, C, as constructed and applied to the ribs, c, and made to operate therewith, substantially in the manner and for the purpose set forth.

34,448.—J. S. Rankin, of Madison, Ind., for Improved School Desk :

I claim building the frame work of a series of school desks on a continuous central wooden joist or beam, I, running fore and aft; the desks and joist being mutually framed into each other, substantially as set forth.

34,449.—B. F. Skinner and A. Plummer, Jr., of Mystic Bridge, Conn., for Improvement in Breech-Loading Firearms :

We claim, first, The arrangement of the eccentric axis of the swinging breech, in a position oblique to the axis of the bore or barrel, substantially as and for the purpose specified.

Second, The combination of the needle bolt or hammer, F, with its spring, G, inclosed in the swinging breech, B, with the slide, J, and trigger, h and I, in the frame, A, or their equivalents, operating substantially as described.

Third, Though we do not claim broadly setting up the breech of a breech-loading firearm by means of a screw, we claim the employment, for setting up the breech, of a screw, D, which also serves as one of two centers on which the breech swings, to open and close, substantially as and for the purpose specified.

34,450.—R. N. Stewart, of Philadelphia, Pa., for Improvement in Gas Burners :

I claim, in combination with the plate, B, arranged as described, the hinged cap, C, and clearing plate, D, constructed, combined and arranged to operate substantially in the manner described, and for the purpose specified.

34,451.—A. Stockwell and B. D. Humes, of Millbury, Mass., for Improvement in Looms :

We claim, first, The lever, N, forced by a spring against the yarn on the beam, and connected with the slide bar, L, by a link, M.

Second, The tension arm, O, operated substantially as set forth.

Third, The slide bar, L, the rocker lever, E, with its pawl and ratchet mechanism, the shaft, D, the levers, K J, the movable worm, C, and its gear as applied to the yarn beam.

We also claim the combination of the pawl, U, and its rack, with the yarn-delivering and taking-up mechanisms, constructed in manner and so as to operate substantially as specified.

34,452.—L. B. Tyng, of Lowell, Mass., for Improvement in Railroad Joints or Chairs :

I claim a rail coupling constructed and consisting of a single piece, embracing the combination of features, substantially as set forth, and its combination with railroad rails, that is to say, I claim a stiffening rib, o, formed and constructed longitudinally in or upon the base of a rail coupling, composed of a single piece, having a spring bow to clasp the rail base, and jaws to clamp the rail stem and rivet or bolt thereto. I do not intend by this to limit my invention and claim to the particular form and construction of rib represented in the drawing, but to such form or forms and construction of rib as may be most convenient and will produce the same effect. I also claim the combination of the rigid jaws, with a spring bow in the aforesaid rail coupling, substantially as set forth.

34,453.—O. C. Washburn, of Philadelphia, Pa., for Improved Composition for Making Oil Cloth :

I claim the new mode of making coating paste for the manufacture of oil cloths, in all their varieties, by a combination of carbonate of ammonia, white vitriol, boiled oil and water, substantially as set forth.

34,454.—William Weitling, of New York City, for Improved Stitch for Buttonholes :

I claim a stitch work for edging and buttonholes, this stitchwork being a combination of three threads, by which combination the one thread, when passing through the cloth loop checks the other when passing round the edge of the cloth, and both of these being loop-checked on the other side of the cloth by the thread of the shuttle, or its equivalent, as set forth.

3,455.—J. W. Wilcox, of West Roxbury, Mass., for Improved Mode of Preventing Corrosion of Steam Boilers, Vats, Tanks, &c.:

I claim so purifying the water as it passes from the condenser to the boiler of the steam engine as to free it from all metallic salt destructive to iron, in the manner substantially as described.

Second, I claim the rupture or breaking of any galvanic or electric current that would otherwise exist between the steam boiler, and all other connecting steam or water fixtures that may be composed of metals that are electro negative to iron, substantially in the manner and for the purposes set forth.

34,456.—Hosea Willard, of Vergennes, Vermont, for Improved Clothes Bar :

I claim the construction of the bracket, A, with a projecting shelf, D, and stirrups, a, substantially as shown and described, in combination with the bars, B, whereby the inner ends of the bars, B, will bear against the shaft, D, which will resist the weight placed upon the bars and keep them in a horizontal position, all as set forth.

The arrangement of the bars, B, to fold toward and radiate from a common center, in combination with the bracket, A, as shown and described.

[See engraving on another page.]

34,457.—S. D. Woodbury, of Lynn, Mass., for Improvement in Camp Stoves :

I claim, first, Forming the fire chamber of two sections of a conical or other tapering form, that enables one section to be placed within the other, substantially in the manner and for the purpose described.

Second, I claim forming a sectional stovepipe of tapering pieces, when said tapering pieces are susceptible of being dismembered from each other and from the stove itself, and the parts held together by the wedging of the pieces themselves when the stovepipe is drawn out or erected, substantially as described.

34,458.—J. W. Browne, of New York City, assignor to J. M. Van Wagner, of Summit, N. J., for Improvement in Weather-Strip Molding :

I claim the new manufacture of improved weather-strip molding, substantially as described.

34,459.—Elliot Dickerman, of Middlefield, Conn., assignor to Metropolitan Washing Machine Company, of Middletown, Conn., for Improvement in Clothes-Wringing Machines :

I claim constructing the frame of a clothes' wringer, in two or more parts, connected together in the manner of a vice or tongs, so as to form a movable jaw, operated at a point or points above the tub or vessel and adapted to clamp the machine upon said tub or vessel, substantially in the manner set forth.

34,460.—E. S. Bennett (assignor to himself, James Thoubboron and Lydia Brown), of Brooklyn, N. Y., for Improvement in Locks :

I claim the bent or angular keyhole, formed substantially as shown, in combination with the divided key shank, e, connected by the universal joint, f, for the purpose specified.

34,461.—John Dillingham (assignor to Jesse Follet), of Turner, Maine, for Improved Fender or Sheath for Boots and Shoes :

I claim, first, The connection or union of the covering, for the upper leather and sole of the toe of the boot or shoe, in one entire piece of metal or other substance, as novel, and, therefore, my improvement.

Second, I also claim as novel the peculiar form of the sheath, whereby the covering for the upper and under leather of the shoe or boot is connected by a central flange to support it; therefore not liable to get out of place.

34,462.—H. P. Gengembre, of Tarentum, Pa., assignor to G. W. Howard, of Pontiac, Mich., for Improved Method of Storing Oils :

I claim the method described of storing oils, in order to prevent leakage from hydrostatic pressure.

I also claim storing oils in tanks constructed with tight sides, but open at bottom and immersed in water, in order to relieve the sides thereof from hydrostatic pressure, substantially in the manner described.

34,463.—E. J. Hall, of Highgate (assignor to himself and C. P. Stimets), of Vermont, for Improved Spring Caster :

I claim the combination of a roller caster, with a spiral spring or springs, C, when the latter are suspended to a plate, b, resting or bearing loosely on a shoulder or bearing, a, on the arbor, B, to admit of the free rotation of the arbor without effecting the tension of the springs, as set forth.

[The object of this invention is to combine a special spring or springs with an ordinary roiler caster, in such a manner that an elastic or yielding support will be given the article of furniture to which the caster is applied, and, at the same time, allowed to perform its special function precisely the same as if the spring or springs were not applied to it.]

34,464.—T. S. Lambert (assignor to J. S. Wright), of Peekskill, N. Y., for Improvement in the Mode of Constructing Garments :

I claim, first, The application of the elastic band to reta in the garment in its proper position at the waist, in the manner set forth.

Second, The application of the elastic band to retain the garment in the proper position at the neck, in the manner set forth,

Third, The making the garment of such proportions at the waist and neck, as are set forth.

Fourth, The application of the elastic cords, in front in combination with the fly, as set forth.

Fifth, The combination of the elastic bands at the neck and waist, and the combination of the elastic bands at the neck, waist and bottom of the garment, as set forth.

34,465.—Charles Kirk (assignor to Charles Monson and Stillman Moore), of New Haven, Conn., for Improvement in Dry Gas Meters :

I claim so constructing and operating a dry gas meter that the alternate expansion of the two apartments of the double bellows, while it measures the gas will regulate the opening and closing of the valves, which admit the gas alternately into the apartments, to be measured, and after being measured allow it to pass out for use, when the whole is constructed, arranged and fitted for use, substantially as described.

Second, I claim the method of opening and closing the two pairs of valves, by means of the valve rod, i, and the helical springs, l and m, when they are arranged, connected and fitted to produce the result, substantially as described.

Third, I claim the described method of registering the quantity of gas thus measured by the alternate expansion of the two apartments of the double bellows, by means of the slide and clog or hand, substantially as described.

Fourth, I claim the use of the additional bellows, N, to counteract the varying pressure, in the main, when fitted to close its induction valve by its own expansion, and to allow it to be opened by its own contraction, substantially as described.

34,466.—Thomas Newcomb, of Kingston, Mass., and C. C. Newcomb, of Warren, Maine, assignor to Thomas Newcomb, of Kingston, Mass., for Improved Stump and Rock Extractor and Elevator :

We claim the described improved arrangement of the detaching springs or devices, K K, with respect to the pall bars, G′ H′, and the brake, I.

We also claim the combination of the pulley hangers, N N, with the sprocket wheel, D, the supporting frame, B, and the mechanism for operating the sprocket wheel.

We also claim the arrangement of the hanger or staple, a, with respect to the sprocket wheel and its rotating machinery.

34,467.—Henry Newhouse (assignor to N. S. Bouton), of Chicago, Ill., for Improvement in Machines for Cutting Twist Moldings :

I claim, first, The grooved wheel, a, with the switches or their equivalents, substantially as described.

Second, The knife holder, B, constructed and operated substantially as described.

Third, The knife shifters, b b, in combination with the knife holder, used in the manner and for the purpose specified.

Fourth, The combination of the cylinder, C, with the spiral grooves thereon, or their equivalents, for directing the knife, substantially as and for the purpose specified.

Fifth, The knife guide, ring, D, with its guide, d, in combination with the spiral grooves of cylinder, C, as specified.

Sixth, The combination of the knife holder and its adjusting mechanism, with wheel, E, and the knife-guiding mechanism, operating automatically as and for the purpose specified.

34,468.—Adam Oot (assignor to himself and M. S. Clark), of Minetto, N. Y., for Improvement in Camp Stoves :

I claim making a portable stove in separate plates or sheets, attached together by staples and keys, so as to be readily taken apart and put together, substantially in the manner and for the purpose described.

34,469.—W. E. Prall (assignor to himself, Harry Eastman and W. A. Witham), of Maineville, Ohio, for Improved Evaporating Pans for Saccharine Juices :

I claim, first, A series of evaporating pans, descending from the front of the furnace to the chimney, as shown and described.

Second, In the described combination with a descending series of evaporating pans, the arrangement of side defecators, F F, isolated from the fire, and communicating with the first and second evaporating pans in the manner and for the objects stated.

Third, I claim the fenders, O, when used in the described connection, with a series of evaporating pans, descending from the front toward the chimney.

34,470.—J. E. Walcott (assignor to W. H. Blackler), of Boston, Mass., for Improvement in Process of Electroplating Iron and other Metals with Copper :

I claim the process of electroplating with copper, substantially as described.

34,471.—N. W. Wheeler, of Brooklyn, N. Y., assignor to Simon Stevens, of Lancaster, Pa., for Improvement in Tracter motive Engines :

I claim, first, The combination of the traction drum, A, driving wheels, B B, and guide wheels, c c c c, substantially as and for the purposes described.

Second, Supporting the feed water tank, E, within the drum, A, and upon the frame, D D, by means of the brackets, R R, the whole being arranged substantially as described.

RE-ISSUES.

1,276.—George Mallory, of Watertown, Conn., for Improvement in Hoop Skirts. Letters Patent dated Oct. 19, 1858.

I claim providing for the vertical flexure of one or more of the hoops of a skirt at the sides thereof, by means of flexible pieces, or their equivalents, operating suostantially as and for the purpose specified.

DESIGNS.

1,538.—P. H. Drake, of Binghamton, N. Y., for Design for a Bottle.

1,539.—J. W. Hayes, of Newark, N. J., for Design for a Trade Mark on Sword Blades.

1,540.—Victor Meyer, of New York City, assignor to Alden Sampson & Sons, of Manchester, Maine, for Design for Floor Cloths Pattern.

1,541.—G. B. Owen, of New York City, for Design for a Clock Case.

New Publications.

TOM TIDDLER'S GROUND; a Christmas and New Year's Story, for 1862. By Charles Dickens.

THE BROKEN ENGAGEMENT; or Speaking the Truth for a Day. By Mrs. Southworth.

THE FLOWER OF THE PRAIRIE. By Gustave Aimard.

The above are new publications, just issued by Frederick A. Brady, No. 24 Ann street, New York City.

CASTLE WAFER; or the Plain Gold Ring.

TREASURE TROVE; or Accounts of Irish Heirs. By Samuel Lover.

THE WARDEN. By Anthony Trollope.

These are recent publications by Messrs. Dick and Fitzgerald. This firm has evinced excellent taste and judgment in the publicaion of these works. The style is admirable, especially "The Warden." It reminds us of the excellent edition of British Classics, by Bernard Touchnitz, of Leipsic.

MISTAKES OF EDUCATED MEN. By John S. Hart, LL. D., Editor of the *Sunday School Times*, and late Principal of the Philadelphia High School. 12mo., muslin, gilt, Price 50 cents. Published by J. C. Garrigues, No. 148 South Fourth street, Philadelphia.

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PATENTS FOR SEVENTEEN YEARS.

The new Patent Laws enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from **$30** down to **$15**. Other changes in the fees are also made as follows :—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting reference to such countries as discriminate against citizens of the United States—thus allowing English, French, Belgian, Austrian Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN ; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. More than 5,000 such examinations have been made through this office during the past three years. Address MUNN & CO., No. 37 Park-row, N. Y.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention. If susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fees by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co No. 37 Park-row, New York.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats, in English and German, furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our Branch Offices.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of the case, inclosing the official letters, &c.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

TO OUR READERS.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on Design atents, when two good drawings are all that is required to accompany he petition, specification and oath, except the government fee.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when he time for which it was pre-paid has expired.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given ; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona fide* acknowledgment of our reception of their funds.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO., No. 37 Park-row, New York.

Notes and Queries

L. G., of Vt.—You cannot obtain a patent for making horse-power link of wrought, instead of cast-iron. It is a mere change of one material for another in the fabrication of an article. Any one would have a right to do this.

H. G., of Pa.—A patent was granted July 9, 1857, in England, to C. Logie, for a projecting claw, having serrated edges attached to a musket for tearing off the ends of cartridges.

M. R. F., of Mass.—Starch has been employed for mixing with soap. You will find a statement to this effect on page 382, Vol. XI. (old series) SCIENTIFIC AMERICAN. Potatoes, wheat, and silicate of soda have also been used as soap mixtures. No patent can therefore be obtained for starch or such vegetable substances as those in which it is the principal ingredient.

S. G., of Mich.—You can run your water wheel at any speed you please by adjusting the load and gearing. It is customary to run large wheels at a speed of 6 or 7 feet per second at the periphery.

C. N. B., of Pa.—We will pass your questions in relation to photography over to Professor Seely, editor of the *American Journal of Photography*, who will doubtless answer them to your satisfaction We think well of the wrench, but you can judge of it as well as we can.

R. W., of Conn.—You will find a description of the composition and the method of its application, for making enameled leather, on page 358, Vol. XI. (old series) SCIENTIFIC AMERICAN.

E. A. T., Wis.—Babbitt metal is composed of 25 lbs of Banca tin, 2 of antimony, and half a pound of copper. They are first melted together, and run into ingots, then used to line journal boxes by re-melting and casting. Melt the copper first, and add the antimony, then the tin, very cautiously.

G. R., of Mass.—Oxalic acid is not only injurious to the hands when used in polishing brass, but is a dangerous poison also. We do not think you require any acid to scour brass when you use fine emery. Diluted sulphuric or muriatic acid, if you employ it warm, will answer just as well as oxalic acid. Try warm water and the emery first ; if this does not answer, try dilute muriatic acid, which is cheaper and just as good as oxalic acid. The pickle to which you refer for brightening brass is dilute muriatic acid.

J. K. W., of Kansas.—There is no published work on American Millwrighting and Milling, that comes up to the practice of the present day. A work on this subject by a thoroughly competent person, should meet with an extensive circulation.

E. M., of N. Y.—In selling a patented article, it is not necessary to put the patentee's name on it.

B. L., of Mo.—We regret that we cannot give you information about the proper use of sulphur in the cure of asthma. We copied the paragraph from a foreign journal and have no means of getting at its origin. We hope peace and good order will soon be restored to your State.

S. P. Myers, of La Grange.—Please to inform us in what State you reside.

M. C. B., of Min.—If you are guilty of misrepresenting the date of your patent to the purchaser it would affect your standing in a court of justice.

M. A., of Pa.—There would be no gain by the admission of the steam between the two pistons to act upon both simultaneously. It has been erroneously supposed by more than one person with whom we have been acquainted, that there would be a gain, and we have known of models being made with a view to the application for patents on engines with such system of pistons.

S. P. N., of N. Y.—The mode of charging a piece of steel with magnetism, is to place one end of a magnet against the piece and rub it the whole length; repeating the operation always in the same direction.

V. J. M., of Ohio.—We know of no substance that can safely be relied upon to take the scale from steam boilers.

B. F. R., of R. I.—When General Fremont had command in Missouri, he organized a corps for signalizing in the night by means of the electric light. In the few cases in which circumstances would permit, this light might doubtless be used for watching the motions of the enemy.

G. D. H., of Ohio.—Overman's work on the manufacture of iron was published in 1850 by Henry C. Baird, of Philadelphia.

J. R. K., of Mich.—After many trials, the engineers of the Metropolitan Mills in this city have adopted the following plan for mill steps. A steel cylinder, an inch in diameter, is inserted into the axis of the spindle at its lower end, and this rests upon two or three disks of steel, of a diameter equal to that of the cylinder, which are placed loosely in a cylindrical cavity in the step. The disks revolve one upon another but with a motion slower than that of the spindle ; the spindle's motion being divided among them

C. C. P., of Ohio.—Twelve pounds of fresh water have been evaporated into steam from a temperature of 212° with 1 lb. of coal, but we have not heard of marine boilers evaporating more than 9 lbs. of salt water. From 6 to 8 lbs. of water are more usually evaporated in marine boilers.

E. W., of N. J.—Many patents have been taken out for faucets, and it is quite possible that you may have been anticipated. You had better send us a sketch of your device and have a free examination made. Such would be the most prudent course to pursue. Your wheel is old and impracticable. The same thing has been frequently prepared by searchers after a perpetual motion.

T. H. I., of Mass.—We advise you to study some good work on Natural Philosophy as the most useful for a young mechanic apprentice.

S. I. F., of Wis.—There is no good practical work published known to us on plain and ornamental painting embracing "house painting," fancy lettering, and carriage painting.

A. S., of Pa.—Blue stars in fire works are composed of powder in meal, 8 ounces, saltpeter, 5 ounces, sulphur 2½ ounces, isinglass, 2 ounces, and a little alcohol. Two ounces of strontian added to the same mixture will make a crimson light. Be careful in mixing these substances, and dry them perfectly afterward, or they will not produce the desired result.

G. F. S., of Mass.—More heat is produced from coal by burning it directly, than by first converting it into illuminating gas and then burning the gas—for heat is consumed and lost in making gas. Experiments are now in progress in France for testing the economy of gas engines. Your other question involves the fallacy known as perpetual motion, which is necessarily a fallacy from the laws of nature. Your question of the relative explosiveness of mixtures of illuminating gas and atmospheric air, and those of hydrogen and atmospheric air involve so many considerations that we shall not take the trouble to investigate it.

D. S. V., of Mich.—Your plan for forcing vegetation by carrying steam through drain tile in the ground is entirely impracticable. The steam would be condensed very soon after leaving the boiler. Hot air is used in this way for some greenhouses, but for fields it would be too expensive.

A. D., of Wis.—It is impossible for us to give an opinion of your alleged improvement in straw cutters without the aid of a sketch and description. We do not understand what you wish to claim.

J. D. R., of Pa.—When two railroad trains meet upon a double track road and pass each other, the reason why the tone of the bell becomes flattened to the ears of the passengers after passing is this. A high note is formed by a greater number of vibrations in a second than a low note, and as the bell is borne away from the passenger it takes each succeeding vibration a longer time to reach his ear, and thus he hears fewer in a second. The common telegraph wire casts a shadow much broader than itself because the sun is broader than the wire. The shadow is not a perfect shadow, but a penumbra. The heated air rising from a stove, refracts rays of light passing through it, and thus prevents them from reaching the floor or wall ; producing a shadow as effectually as if the rays were reflected.

C. G., of N. Y.—Sebastopol before the siege was scarcely more than a collection of forts. They were sea-coast fortifications, but with provision as usual for defence on the land side.

A. E. J., of Ohio.—We have no doubt that your opinion is correct, that it would be impossible to raise cotton in the northern part of Ohio. The fact that the vine grows well there, is no evidence that cotton would. Black Hamburg grapes are ripened in the open air in the north of England.

SPECIAL NOTICE—FOREIGN PATENT.—The population of Great Britain, is 30,000,000; of France, 35,000,000 ; Belgium, 5,000,000; Austria, 40,000,000; Prussia, 20,000,000; and Russia, 60,000,000. Patents may be secured by American citizens in all of these countries. Now is the time, while business is dull at home, to take advantage of these immense foreign fields. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. Nearly all of the patents secured in foreign countries by Americans are obtained through our agency. Address Munn & Co., 37 Park row, New York. Circulars about foreign patents furnished free.

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Money Received

At the Scientific American Office on account of Patent Office business, during one week preceding Wednesday, Feb. 26, 1862:—

S. and A., of Mass., $25; J. S., of Ill., $15; C. W. C., of N. Y., $15; E. C. McK., of N. Y., $20; T. H. R., of Vt., $20; S. W. T., of N. Y., $40; I. and E., of Pa., $20; B. F. C., of N. Y., $25; N. T. B., of Iowa, $25; J. W. B., of N. Y., $40; J. G., Sr., of R. I., $10; J. R., of N. Y., $15; J. L. of Wis., $15; A. and A. J. M., of Me., $15; W. W. G., of Me., $25; W. T. A., of Iowa, $30; E. Y., of N. Y., $15; A. C., of N. Y., $25; E. S., of N. Y., $25; H. K. A., Jr., of Iowa, $25; D. C. A., of Mich., $15; H. M. H., of Pa., $22; C. G. D., of N. Y., $43; J. J. M., of Conn., $25; I. N. B., of N. Y., $25; R. T. H., of Mass., $15; R. W. G., of Me., $20; A. R., of N. Y., $20; J. H. C., of Conn., $20; W. T. G., of Ill., $45; A. C. S., of U. S. N., $40; M. and S. G. T., of Ohio $20; E. M., of Conn., $40; S. and L., of N. Y., $15; D. and H., of L. I., $25; F. B. P., of N. Y., $15; J. D., of Ill., $12; H. R., of Ill., $50; E. R. R., o N. J $15; R. & Co., of N. Y., $15; L. G., of N. Y., $12; C. D. I., of Mass., $15; H. S., of N. Y., $50; A. M., of N. H., $15; I. M. H., of Va., $20; Z. G. H., of Iowa, $10; J. P. W., of N. Y., $60; O. W. S., of Me., $25; V. L., of N. Y., $12; J. E. S., of N. Y., $25; J. H., of N. J., $15; A. C., of N. Y., $15; M. G., of Pa., $20; S. E. and P., of Wis., $20; C. and G., of Pa., $20; F. A. R., of Mich., $15; M. and A., of Wis., $15; E. D. W., of Pa., $30; A. H. N., of Mass., $25; E. F. B., of Conn., $15; L. H., of Ill., $15; H. G., of Mass., $25; C. H., of N. J., $22; J. O. F., of N. Y., $15; N. F. E., of Vt., $15: R. P. G., of Wis., $30; A. W. W., of Conn., $15; S. H. N., of Iowa, $25; R. S., of N. Y., $15; W. E. B., of R. I., $15; J. A. W., of N. J., $15; A. J., of N. Y., $25; P. H., of N. Y., $25; A. W., of England, $35.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from Feb. 19, to Wednesday Feb. 26, 1862:—

C. G. D., of N. Y.; M. J. E. and T., of England; O. W. S., of Me.; E C., of V. Y.; C. G. D., of Y.; J. D., of Ill.; H. G., of Mass.; H. S., of C. E.; E. S., of N. Y.; B. F. C., of N. Y.; H. R., of Ill., 2 cases; A. C. S., of U. S. N.; J. L. L., of Pa.; A. J., of N. Y.; J. J. M., of Conn.; C. H., of N. J.; W. W. G., of Me.; A. F. N., of Mass.; I. N. B., of N. Y.; J. E. S., of N. Y.; I. M. H., of Pa.; S. W. T., of N. Y.; R, W. G., of Me.; S. and A., of Mass.; N. T. B., of Iowa; V. L., of N. Y.; W. T. A., of Iowa; P. H., of N. Y.; D. and H., of L. I.; S. H. N. of Iowa; H. K. A., Jr., of Iowa; A. W., of England.

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No charge is made for the publication, and the cuts are furnished to the party for whom they are executed as soon as they have been used. We wish it understood, however, that no secondhand or poor engravings, such as patentees often get executed by inexperienced artists for printing circulars and handbills from, can be admitted into these pages. We also reserve the right to accept or reject such subjects as are presented for publication. And it is not our desire to receive orders for engraving and publishing any but good Inventions or Machines, and such as do not meet our approbation in this respect, we shall decline to publish.

For further particulars, address—

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METALS.—THOS. J. POPE, NO. 92 JOHN STREET, New York City.—Charcoal and Anthracite Pig Iron, direct from furnaces, Bar Irons, to order, from mills, Ingot Copper, Lake, Baltimore, &c., Old Copper, Lead, Tin, Antimony, Cut Nails, Babbit Metal. 10 5*

GIRD'S BUDDING KNIFE.—THE ATTENTION OF cutlers and manufacturers of horticultural implements is called to the above invention. For description and engraving see SCIENTIFIC AMERICAN, No. 10, Vol. 6. State rights for sale. Address for further particulars E. D. GIRD, Cedar Lake, Herkimer Co., N. Y., or RICHARD GIRD, Santa Rosa, Sonoma Co., California. 1

EMPLOYMENT! AGENTS WANTED!! A NEW enterprise.—The Franklin Sewing Machine Company want agents, at a salary of $40 per month and expenses paid. For particulars address, with stamp, HARRIS BROTHERS, Box 302 Boston, Mass. 10 tf

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MUNN & CO. are permitted to refer to Hon. Judge Mason, Hon. Joseph Holt, Hon. W. D. Bishop, Ex-Commissioners of Patents.

NEW YORK EMERY WHEEL COMPANY,
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MORGAN IRON WORKS, NEW YORK, Nov. 30, 1861.

NEW YORK EMERY WHEEL CO.—*Gentlemen:* Having given the Patent Solid Emery Wheel manufactured by you a severe trial, I do, without hesitation, pronounce it the best wheel I have ever used, as it cuts quick, wears slow, and does not glaze or soften by friction.

Respectfully yours, JOHN GALLIGHER,
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A descriptive circular, containing a list of prices, &c., will be forwarded on application. Address NEW YORK EMERY WHEEL CO., No. 28 Frankfort street, New York. 4tf

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Having always maintained the duty of good citizens in all parts of the land to stand by the Constitution, in its spirit and letter, when that Constitution was assailed and its overthrow attempted, we accordingly at once gave a cordial support to the Government in its patriotic endeavor to assert its lawful authority over the whole land. Believing secession to be rebellion, and when attempted, as in this case, without adequate reasons, to be the highest crime, we hold

1. That the war was forced upon us by the unjustifiable rebellion of the seceding States.

2. That the Government, as the ordinance of God, must put down rebellion and uphold the Constitution in its integrity.

3. That every citizen is bound to support the Government under which he lives, in the struggle to reëstablish its authority over the whole country.

4. That the Constitution of the United States is the supreme law of the Government as well as of the people; that the war should be prosecuted solely to uphold the Constitution and in strict subordination to its provisions: and the war should be arrested, and peace concluded, just so soon as the people now in revolt will lay down their arms and submit to the Constitution and laws of the land.

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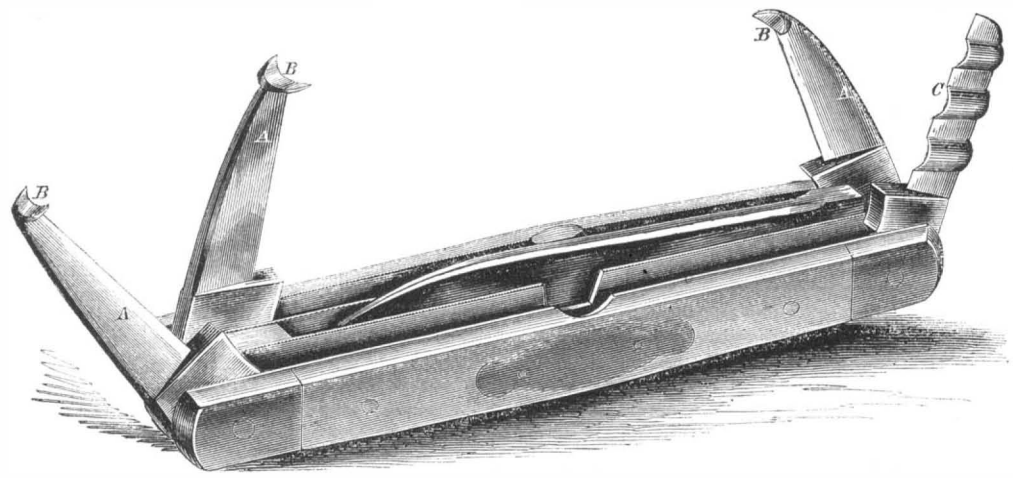
Art of Budding Trees.

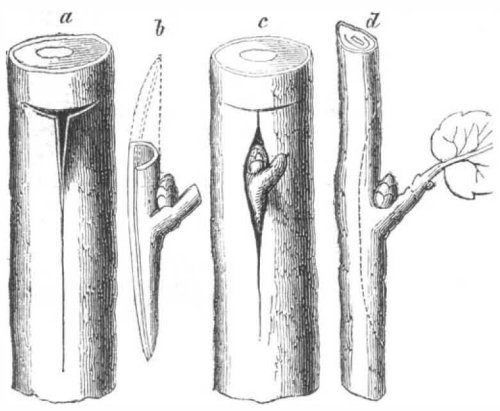
If a thousand apple trees grow from seed planted in the ground, whether the seeds are taken from several varieties of apples, or from one variety, the trees will each bear a peculiar kind of fruit, differing from all the others, and different from the apples which contained the seed that was planted. In other words, all seedlings are new varieties. But we have the power of making all these trees bear pippins or spitzenbergs, or any other variety of apple that we choose. This is done by inserting a twig or bud of the pippin, spitzenberg, or other tree selected, into the trunk of the seedling, and cutting away the top of the seedling above the bud, so that the tree may grow from the latter. Though this process is doubtless familiar to many of our readers, the fact remains



GIRD'S BUDDING KNIFE.

wonderful and mysterious, that the circulation of the sap through the little bud should determine the form, size, color and flavor of all the fruit that grows upon the tree through all the years of its existence.

The mode of inserting the bud is very simple, and is illustrated in this cut. In the month of August, a twig of the current year's growth is cut from the tree of the selected variety, and the leaves cut off, leaving a small portion of the leaf stalk as shown at *b*. At the junction of this leaf stalk with the stem upon which it grows, is the bud which is to develop the leaf of the succeeding year, and in case of successful budding is to develop the whole tree. Upon the side of the seedling to be budded is made a T-shaped cut through the bark, and the bark is loosened as shown at *a*. A slip of bark with the bud attached



as represented at *b*, is cut from the scion, *d*, of the selected tree, and pushed into the slit in the bark of the seedling, the cut surface of the slip of bark coming in contact with the wood of the seedling as shown at *c*. A string is then wrapped around the seedling to hold the bark and bud in place. In the course of three or four weeks the bud will become attached to the trunk of the seedling, and the bark will heal around it; the sap from the seedling circulating through the bud to keep it alive. The string is now cut and removed.

In the following spring the seedling is cut off close above the bud, when the latter shoots and grows into a tree, which bears the same kind of fruit as the tree from which the bud was taken.

It was formerly the practice to cut the seedling first at some distance above the bud, and then to trim it down after the bud begins to grow. But the writer of this introduced the practice of cutting the seedling close down to the bud before the bud shoots, and painting the wound with a solution of gumshellac in alcohol. This improvement in the operation saves a great deal of tedious labor.

The accompanying engraving illustrates a knife which is calculated to facilitate materially the process of budding. Upon the ends of the blades, A A A, are formed crescent shaped crosses of steel with fine edges for cutting the T-shaped slit in the bark of the tree to be budded. These blades with their crosses are made of different sizes, so that some one of the three may be adapted to the size of the tree to be operated upon.

It is the practice of some horticulturists to remove the bit of wood which is cut from the scion with the bud, and to insert the bark only with the bud. To save this operation, the blade C, is formed with several curves in its edge, so that it will cut the bark alone from the scion without taking off the bit of wood, the curves being of different radii to adapt them to scions of different sizes.

With this knife several operations are reduced to one, and the process of budding is greatly facilitated. The crescent-shaped cross is pressed through the bark making the transverse cut, and then by simply carrying the knife down, the vertical slit is made, and the bark is raised at the same time ready to receive the bud. This knife was used in California, during the last season, for budding several thousand trees, and it gave great satisfaction to the operators.

The patent for this invention was granted Feb. 4, 1862, and further information in relation to it may be obtained by addressing either of the inventors, E. D. Gird, at Cedar Lake, N. Y., or Richard Gird, Santa Rosa, Cal. [See advertisement in another column.]

Jewelers' Gold.

The London *Mechanics' Magazine* contains the following interesting remarks on this subject :—

From very ancient times it has been the practice to divide the ounce troy of gold into twenty-four imaginary parts. An ounce of pure gold, therefore, and what is called twenty-four carat gold, are identical terms. Anything less than twenty-four carat gold indicates that in an ounce weight of that substance there are so many twenty-fourth parts of pure gold, and that the remaining portion of an ounce of it is made up of an alloy of some inferior metal—usually copper. Except for wedding rings, which are, or should be, made of standard gold, consisting of twenty-two parts or carats of pure gold, and two of copper alloy, jewelers seldom use gold of a higher rate of purity than eighteen-carat. How often they use it of a much lower degree of fineness they know best. There is no doubt that it is possible to give almost any color to gold, by the addition of particular alloys, and of late, ingenuity has been at work to give the sixteen-carat gold the appearance of pure gold. This is done by the aid, partly, of what is technically known as the coloring pot, in which the metal is treated to an acid bath of a certain amount of strength. By the judicious use of this contrivance, twenty-two-carat gold may be made to resemble very closely native gold, as found in the shape of nuggets in California or Australia. Nuggets are never, however, found to be pure gold, they consist for the most part of 23 or 23½-carat gold, the fraction being made up of an alloy of some inferior metal. In order to test the purity of gold the application of heat is perhaps one of the simplest means. Pure gold will not be in the least discolored by it, while twenty-three-carat gold will take a slightly red tint. There is this disadvantage about the mode of testing suggested, it will certainly discolor very materially all gold of degrees of fineness inferior to that of twenty-three-carat, and nothing but the acid bath will restore it to its original hue. In order to effect this latter operation on a small scale, nothing more is necessary than to obtain an earthen pipkin, or gallipot, place the article in it, cover it with nitric acid, and hold it over a spirit or gas lamp, or even a candle, until the acid boils. The result will be that the metal will be restored to its original brightness.

As regards the testing of the genuineness of gold coin, there is nothing equal in simplicity or efficacy to weighing it. It is impossible that any metal inferior to standard gold can be used in the manufacture of counterfeit sovereigns or half-sovereigns which will give pieces, of the same size, of equal weight.

The testing of "Jewelers' gold," when used in the manufacture of many kinds of trinkets is a matter attended with considerable risk and difficulty, and perhaps the only means readily at the command of the purchaser for ensuring a proper relationship between quality and price in such cases, is to ascertain the respectability of the seller.

[Twenty-four-carat gold means pure gold, independent of its quantity—whether an ounce more or less.—Eds.

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